

JOURNAL
OF
THE MILITARY SERVICE INSTITUTION
OF THE
UNITED STATES.

"I cannot help plead to my countrymen, at every opportunity, to cherish all that is manly and noble in the military profession, because Peace is enervating and no man is wise enough to foretell when soldiers may be in demand again."—SHERMAN.

VOL. XVIII.

JANUARY, 1896.

NO. LXXIX.

THE CAMPAIGN AGAINST THE SIOUX IN 1876.

(From Official Sources.)

BY COLONEL ROBERT P. HUGHES, INSPECTOR GENERAL.

THE events which I am about to discuss occurred more than nineteen years ago. The central figure in them was General Terry, whose self-sacrificing charity and kindness of heart induced him to maintain unbroken silence in regard to them to the end of his life, except on rare, and in a sense confidential, occasions to a few intimate friends. Of these some are now dead, and certainly none are prepared, after such a lapse of time, to trust to memory alone for accuracy of statement. The official records are scattered and difficult to be obtained; some, known to have existed once, have disappeared and cannot now be found. Hence it can be readily understood that my determination to collect all the facts from authentic sources, in order to convincingly answer General Fry's comments on Captain Godfrey's story when they appeared in the *Century Magazine* for January, 1892, imposed a heavy task upon me; and, embarrassed as I was with the usual duties of my office, it was not accomplished without considerable delay. However, when the facts had been collected and properly arranged, they were presented to the editor of the *Century* in order that its readers might see both sides of the controversy and arrive at a just conclusion. The tender of my letter

was not accepted. I was informed that, if I reduced its length to the number of words in Fry's letter, it would then be accepted. Considering the fact that Fry started with Godfrey's tale as an extensive base from which to operate, that there were errors of fact in both productions to be corrected, and in addition to this the collated facts to be given, it will be readily understood that in fairness to the interests at stake, the terms offered could not be accepted.

It thus being impossible to reach the readers of the *Century*, and in consideration of the fact that such a statement, although compiled from official sources, must cause additional pain to those innocent souls who have already suffered more than enough, I determined to wait and see what the effect of the articles in the *Century* would be, and let this be the guide in my course of action.

In *Scribner's Magazine* for June, 1895, is an article from the pen of Dr. E. Benjamin Andrews, President of Brown University, entitled "A History of the Last Quarter-century," in which these two sentences appear:

"Some of General Terry's friends charged Custer with transgressing his orders in fighting as he did. This has been disproved."

In response to an inquiry, Dr. Andrews writes me under date of July 3, 1895: "My statement in the *Scribner* is based on what Godfrey and Fry say in the *Century Magazine*. Vol. 43, pages 358-387."

I was not willing to believe that contemporary history would perpetuate error in this one-sided way, but I am now convinced that I failed in my duty to my friend and commander in not meeting the attacks at once; for it is now evident that the authentic facts should be placed where they may be accessible to the historian writing of that period.

It may, and probably will be said that heed should be given to the classic aphorism: *de mortuis nil nisi bonum*. To this my reply is that it is not I who compel this presentation of facts. In common with many of General Terry's friends to whom they were known, I have paid due respect to his own charitable reticence. The errors of Godfrey and Fry, now accepted by Andrews, make it obligatory on me to produce the facts in my possession. The responsibility for their not being published before General Fry passed away rests with his own publishers.

Except to correct a few errors bearing on material facts, I shall

leave Captain Godfrey's paper, which is the text for Fry's, to others. It does not nearly enough concern the matter in hand to make it necessary to remark upon his failure to state *all* of the well known facts.

Fry's lack of information will be made apparent in the compilation from the records which is to follow.

The question at issue arose from a statement made by Dr. T. T. Munger in his address at General Terry's funeral,—to the effect that the nobility of General Terry's character was finely illustrated in his conduct in withholding from the public the fact that Custer's disaster was in direct sequence to disobedience of orders, and that by his silence General Terry "suffered an imputation, hurtful to his military reputation, to rest on himself, rather than subject a brave but indiscreet subordinate to the charge of disobedience."

General Fry denies the truth of this assertion of disobedience and says that I deny having authorized Dr. Munger to make any use of my statement of the case to him, although I admit that I was probably the source from which he derived his information, and he reproaches me for failing to establish the fact of disobedience.

It is true that I did not authorize Dr. Munger to use my statement of that fact, and did not expect him to do so. But it is nevertheless true that Dr. Munger was fully justified by the facts in making the statement he did, and I shall show hereafter that this statement was exactly true.

The conversation which led to my mentioning the matter to Dr. Munger is, perhaps, scarcely pertinent, but it may not be amiss to briefly state it. I had gone to his house to see him on business, and was in the act of leaving him when he called me back by the remark and question: "You have been with General Terry for many years; what do you consider to have been his chief characteristic as a man?" My reply was spontaneous—"Self-sacrifice," and, in elucidation of that statement, I cited a series of incidents in which he had sunk all thought of self in consideration for others. Among them I referred to the Custer massacre and stated that, notwithstanding the fact that General Terry could not be held accountable for that terrible disaster, he had accepted the full responsibility rather than leave it with General Custer, who could not defend himself. I distinctly stated that General Custer had disobeyed General Terry's orders. The

military events were not otherwise discussed. Our conversation on this occasion was short and this phase of it was distinctly limited to matters illustrative of the sacrifice General Terry made of himself at the time, and of his uniform and persistent silence ever afterwards under many and very trying provocations.

While I certainly did not expect Dr. Munger to make reference to that particular instance, given in elucidation of what I considered to be General Terry's most marked characteristic, still I wish to assume the full responsibility for my statement.

My position in the case has never been doubtful. I have stated it to others, and would have given the reasons for the belief that is in me to General Fry in person if he had ever suggested at any of our frequent meetings, while he was preparing his article, that he was seeking light upon the subject.

Dr. Andrews, in his letter of July 3d, referring to the two sentences above quoted, also says :

"I meant, however, by the accompanying statement, to imply what I suppose nearly all admit, that Custer was so bent on making a record that he was not duly attentive to the *spirit* of his orders."

The inconsistency between the two statements need not be remarked upon further than to say that by the latter the writer gives up his case, for it is a well understood principle in military orders of this character that the *spirit* is the sum and substance of the whole matter. In issuing orders like those in question, all authorities agree that the situation must be explained to the subordinate as it appears to the commander at the time of giving them, together with the plan and design, in order that the subordinate may exercise his intelligence and execute the "spirit" of his orders in case he finds it impossible, or unadvisable to follow them literally.

I now assume the task of showing that there was disobedience of orders.

The general story of the campaign is sufficiently well known, to need no further recital of it except in so far as may be necessary to correct errors of fact in the statements made by the papers of Captain Godfrey and General Fry.

Although it is to be inferred from General Fry's comments that it was intended that General Terry's command should make a winter campaign and that Custer was prevented from moving by "bad weather," such is not the case.

The suggestion of a quick winter movement was made to

Sheridan by Terry, late in December, 1875. Terry had been in Chicago for a personal consultation with Sheridan, and, after returning to St. Paul, received from him, under date of December 20, 1875, the correspondence between the Interior and War Departments "for report as to the possibility of military operations against the hostile Indians named in the within report."

On the 28th of December, Terry reported that information, gathered from various sources, tended to show that these Indians were then encamped on the Little Missouri River, near its mouth and that, if that were true, it might be possible to strike them by a rapid movement from Fort Lincoln. But, in view of secrecy enjoined upon him in the matter, he had not even communicated with his staff on the subject, nor taken steps to ascertain the precise location of Sitting Bull's camp. He further asked approval of an effort to do this. This he got, and a little later, through Col. Huston, commanding Fort Stevenson, learned that "Sitting Bull and his band moved from the Little Missouri some time ago * * * and there are at present no camps of hostile or other Indians on that stream."

It was not until February 1, 1876, that the Secretary of the Interior informed the War Department that Sitting Bull, etc., refused to obey, and turned them over to be dealt with by the War Department. The matter was referred to the General of the Army, and on the 7th of February, to Sheridan, who, on February 8th sent it to Terry and duplicates to Crook, with instructions to commence hostilities. On February 8th, Terry telegraphed Sheridan: "Sitting Bull has left the Little Missouri and is now on the Yellowstone probably as high up as Powder River," to which Sheridan replied: "If Sitting Bull is not on the Little Missouri, as heretofore supposed to be, I am afraid but little can be done by you at this time."

February 17th, Terry communicated with Crook who replied March 1st from Fort Fetterman: "I hasten to answer before leaving here. The command under General Reynolds has already started. I expect to accompany the expedition so as to get some idea of the country and the difficulties to be overcome in a *summer campaign*. I hope to make this *scout* and get back before so using up my stock as to unfit them for a summer's campaign."*

On this "scout," General Crook encountered Crazy Horse,

* The italics are my own.—R. P. H.

was repulsed and returned. It is clear that there was no order to Custer to move, which Fry asserts existed, and therefore nothing could result from his "inability to move." On the contrary, Terry writes Gibbon, under date of February 21st: "I expect to start Custer about the 1st of April," and, about the same time, explained his plan to Sheridan: "*I think my only plan will be to give Custer a secure base well up on the Yellowstone from which he can operate, at which he can find supplies, and to which he can retire in case at any time the Indians gather in too great numbers for the small force which he will have.*"* For this purpose he proposed to send six companies of infantry and asked for *steamboat* transportation for them, clearly showing that there was no purpose to move Custer before navigation opened, which would be April at the very earliest, and most probably a month later. From this time on, preparations continued, all directed to this plan, which contemplated Custer's going in command as indicated.

Fry attributes the accession to the Sitting Bull and Crazy Horse forces from the agency early in the spring to the "repulse of Crook's column, and the inability of Custer to move." It is shown that Crook's movement was merely a scout, and that no movement by Custer had been intended, and if Fry knew anything of Indian habits, he would have known what Terry and Crook both knew and calculated upon, that with the opening of spring there would be large desertions from the agencies to the hostiles, chiefly of fighting men. Neither of the causes assigned by him for this, had they existed, would have seriously affected this fact.

Fry then says: "It *happened* that while the expedition was being fitted out, Custer *unwittingly* incurred the displeasure of President Grant, who directed that Custer should not accompany the column. Through his appeal to the President and the intercession of Terry and Sheridan, Custer was permitted to go in command of his regiment, but Terry was *required* to accompany and command the column."

The statement that "Custer *unwittingly* incurred the displeasure of President Grant who thereupon directed that he should be deprived of his command," attributes to President Grant conduct and motives little in accord with his well-known character. Is it possible that President Grant would have arbitrarily interposed his high office to humiliate an officer, and deprive him of his rights, for any reason that could be of so little gravity as that the

officer had "*unwittingly* incurred his displeasure"? Not many of our people will believe that of Grant, and how far it was from true is shown by the telegrams from Sheridan to Sherman which follow. The latter part of the statement that "Custer was permitted to go, but Terry was *required* to accompany and command the column," conveys an implication of reluctance on Terry's part to go that is very wide of the facts. As will be seen, it was originally intended that Custer should command one of the columns. When he was ordered to be relieved and forbidden to go, the question of who should be substituted for him was discussed between Terry and Sheridan, ending in the latter's telegraphing:

"*The names you suggest are very good, but I believe the command will be better satisfied in having the Department Commander in charge.*"

This is the first intimation of the idea of Terry's going.

To this Terry instantly replied:

"*Your dispatch received. I will go myself.*"

Subsequently, as will be noted, Terry, in interceding for Custer, gives strength to his plea for him in saying:

"*Whether Lieutenant Colonel Custer shall be permitted to accompany my column or not, I shall go in command of it.*"

These telegrams make it very clear that Fry's assertion that

"Custer was permitted to go, but Terry was *required* to accompany," does not accurately present the facts either in statement or implication.

It is to be understood that Terry held it to be inadvisable for a Department Commander to abandon the reins of his department—and that was what it amounted to—in order to take command in person of a minor portion of his troops in the field. He always insisted that such opportunities for interesting service belonged as a matter of right to those officers whose rank corresponded with the command employed.

This brings me to the necessary reproduction of the correspondence (chiefly telegraphic) which gives the history of Custer's being relieved from the command Terry contemplated giving him, and his subsequent re-instatement in command of his own regiment.

March 15th, Terry received at St. Paul from Custer at Fort Lincoln a telegram:

"I am just in receipt of a summons from the Sergeant-at-Arms of the House directing me to appear forthwith. I will telegraph and endeavor to

avoid going. Should I be forced to go must I obtain an order from Department Headquarters, or what course must I pursue?"

To which Terry replied:

"You need no order beyond the summons of the Committee. I am sorry to have you go for I fear it will delay our movements. I should suppose that if your testimony is not to the facts, themselves, and will only point out to the committee the witnesses from whom they can get the facts, your information might be communicated by letter or by telegraph, and that being done you might ask to be relieved from personal attendance without exposing yourself to any misconception."

To this Custer sent two replies on the 16th—the first:

"Acting on your suggestion I have sent long telegram to chairman of committee requesting to be allowed to testify here and forward by mail."

And later:

"After further consideration fearing my request to be relieved from obeying summons might be misconstrued into a desire to avoid testifying I have concluded to prefer no request to that effect."

March 24th, Custer passed through St. Paul en route to Washington. He remained in Washington until May 2d. Meantime, April 20th, he telegraphed from Washington to St. Paul that he left that day "en route for St. Paul, stopping at Detroit under orders," and April 24th from New York: "Intended leaving here to-day for St. Paul but have been this moment summoned by Sergeant-at-Arms of Senate to appear at impeachment trial on Thursday. I will leave Washington at earliest moment practicable," and on the same day again telegraphed Terry from New York:

"When I left Washington it was with the understanding with the impeachment managers that I would probably not be required on impeachment trial, but that I should return to Lincoln, and if necessary would be summoned by telegraph. This was after I had made repeated requests to be discharged and to be permitted to return to my post. The summons was a complete surprise to me. I still believe I will be able to get away from Washington this week, the chances being against a trial on grounds of want of jurisdiction, and if the trial takes place it is extremely doubtful if my testimony will be desired. I have strongly represented to the managers the necessity for my presence with my command. I wish you would telegraph me Arlington House at Washington stating the approaching readiness of expedition and the desirability of my presence at Lincoln. I think with that I can induce the managers to permit me to go at once. My absence from my command is wholly against my desire."

And again the same day:

"The Secretary of War will address a communication to impeachment

managers to-day representing the importance of the duties at Lincoln in connection with expedition and requesting that I be permitted to return at the earliest practicable date."

Sheridan telegraphed Terry April 28th :

"The General of the Army telegraphs me that instructions have been received through the Secretary of War coming from the President to send some one other than Custer in charge of the expedition from Fort Lincoln. I wish to consult you as to whom you wish to go in command so as to submit the name to the General of the Army for detail."

Terry replied on same day :

"The officers available at present in the Department are Crittenden 17th and Sykes 20th. Crittenden is senior to Sykes and has intimated a desire for such duty. Reno would like the command but his rank seems to be insufficient, so long as colonels are available. Hazen of the 6th writes me from New York that he expects to return soon to his post, and that he desires useful service, should there be opportunity for him, but that he is summoned to Washington by investigating committee. He is senior to both Crittenden and Sykes but I suppose that he is not immediately available. I propose Crittenden."

Sheridan replied the next day (29th) :

"After a careful consideration of the situation I think the best way to meet it, and that promising the most satisfaction and the greatest success would be for you to go yourself. The names you suggest are very good but I believe the command will be better satisfied in having the Department Commander in charge."

To this Terry replied at once :

"Your dispatch received. I will go myself."

On the same day Custer telegraphed from Washington to Terry :

"Confidential. I telegraphed you yesterday that Secretary Taft would address a communication to impeachment managers looking to my early return to my command. The suggestion was made to Secretary through General Sherman. The Secretary stated to General Sherman he would write the letter after Cabinet meeting, but at the latter he mentioned his intention to the President who directed him not to write the impeachment managers requesting my discharge, but to substitute some other officer to command expedition. I saw Sherman's dispatch and the reply to Sheridan. I at once sought an interview with the managers of impeachment and obtained from them authority to leave. Would have started this evening but General Sherman suggested that I delay until Monday in order to see the President."

And also on the same day :

"I leave Monday for Fort Lincoln for duty with my command, authority to do so having been granted to-day."

On May 1st, Custer telegraphed Terry from Washington :

"At my request order directing me to return via Detroit revoked. I expect to reach St. Paul Friday."

On May 3d, Terry received the following telegram from General Sheridan's headquarters :

"The Lieutenant General directs me to transmit to you the following telegram from the General of the Army for your information and action :

"Gen. P. H. Sheridan, Chicago, Illinois.

"I am at this moment advised that General Custer started last night for St. Paul and Fort Abraham Lincoln. He was not justified in leaving without seeing the President and myself. Please intercept him and await further orders ; meantime let the expedition proceed without him.

(Signed) "W. T. Sherman, General."

"Should Lieutenant Colonel Custer not be intercepted here you will take such steps as will secure his detention at St. Paul until further orders are received from higher authority.

(Signed) "R. C. Drum."

On May 4th, Custer telegraphed Terry from Chicago :

"I have just forwarded the following dispatch and a second one asking that after the first has been considered I be authorized to proceed to Fort Lincoln. I was in the St. Paul train when General Sheridan's staff officer informed me that the General desired to see me."

"Chicago, Ill., May 4th, 1876.

"Gen. W. T. Sherman, Washington.

"I have seen your dispatch to General Sheridan directing me to await orders here and am at a loss to understand that portion referring to my departure from Washington without seeing you or the President as I called at the White House at 10 A. M. on Monday, sent my card to the President and with the exception of a few minutes' absence at the War Department I remained at the White House awaiting an audience with the President until 3 P. M., when he sent me word that he could not see me. I called at your office at about 2 P. M., but was informed by Col. McCook that you had not returned from New York but were expected in the evening. I called at your hotel at 4 P. M., and about 6 P. M., but was informed by the clerk that you had not returned from New York. I requested Colonel McCook to inform you of the substance of the above and also that I was to leave at seven that evening to join my command. While at the War Department that day I also reported the fact of my proposed departure to the Adjutant General and the Inspector General of the Army and obtained from them written and verbal authority to proceed to my command without visiting Detroit as previously ordered to do. At my last interview with you, I informed you that I would leave Washington Monday night to join my command, and you in conversation replied that it was the best thing I could

do; besides you frequently during my stay in Washington called my attention to the necessity of my leaving as soon as possible.

(Signed) "G. A. Custer."

On the same day (May 4th), Custer sent Terry four other telegrams:

"Telegram just received from Sherman states orders have been sent to Sheridan to order me to proceed to Lincoln on duty. I leave in the morning for St. Paul."

Again:

"When will you start from Lincoln? * I am hoping to obtain an early decision in my case from Washington. Sheridan has no information further than that contained in Sherman's two dispatches to him both of which you have seen."

Again:

"I will reach St. Paul to-morrow morning. No decided change since my last dispatch. Will be better understood after interview than by telegraphing details."

Again:

"I still hope that after seeing you the present restrictions may be removed."

On the 5th, Terry received the following telegram from headquarters in Chicago:

"The Lieutenant General directs me to transmit for your information and guidance the following telegram from the General of the Army:

"Have just come from the President who orders that General Custer be allowed to rejoin his post, to remain there on duty, but not to accompany the expedition supposed to be on the point of starting against the hostile Indians under General Terry."

Signed) "W. T. Sherman, General."

"Please acknowledge receipt. (Signed) R. C. Drum."

On May 6th, Terry telegraphed Sheridan:

"At Lieutenant Colonel Custer's request I telegraph that he arrived here, and reported for duty this morning."

An analysis of the preceding correspondence shows that while the preparations were in progress for the Custer column to leave about April or May from Fort Abraham Lincoln, Custer was summoned to Washington by the Sergeant-at Arms of the House of Representatives to testify in the Belknap impeachment case; that he went with some reluctance; that, after reaching Washington, he endeavored to be discharged from the summons and

* The expedition was to start from Lincoln.

return to his command; that, when finally permitted to disregard the House summons, he was almost immediately summoned by the Committee of the Senate; that he endeavored to be discharged from that summons; that, to this end, he sought the aid of the Secretary of War, who consulted the President and was directed not to write to the Committee, but to substitute some officer for Custer in command; that, when this came to the knowledge of Custer, he saw the impeachment committee in person and obtained their permission to leave; that thereupon, in two or three days, he did leave Washington and in this, as expressed by General Sherman, he "was not justified without seeing the President and myself," and was followed by telegraphic orders to Sheridan at Chicago to intercept and detain him; that this was subsequently modified into allowing him to go to Fort Lincoln for duty, but not to accompany the expedition.

It would seem to be impossible for an unbiassed mind to conclude that the foregoing correspondence rested on no other foundation than the displeasure of President Grant "unwittingly incurred."

The causes, alleged at the time, for relieving Custer from command of the expeditionary column had no bearing on, or connection with the campaign of 1876; they related to the operations of a previous year, and it is needless to say that they did not touch the President in any way.

General Custer himself is my authority for stating that, while in Chicago, he endeavored to interest the Lieutenant General in the affair and to secure his intercession with the President in his behalf, but Sheridan declined to do anything in the matter.

Custer then came to St. Paul under orders to go to Fort Lincoln and there remain. Here was still another resort—and it was the last—between him and what he himself denominated "humiliation." This lay in the well-known generosity of General Terry. Custer sought his interposition—how earnestly is testified by General Terry's own words later used to a few persons of whom some are still living:

"Custer * * * and with tears in his eyes, begged my aid. How could I resist it?"

Terry yielded to these pleas and wrote and sent the following dispatch, of which *every word* (including what is signed as Custer's) *was his own composition*:

" Headquarters Department of Dakota,
 " St. Paul, Minn., May 6th, 1876.

" The Adjutant General,

" Division of the Missouri, Chicago.

" I forward the following :

" 'To His Excellency, the President :

(Through Military Channels).

" 'I have seen your order transmitted through the General of the Army directing that I be not permitted to accompany the expedition to move against the hostile Indians. As my entire regiment forms a part of the expedition and as I am the senior officer of the regiment on duty in this department I respectfully but most earnestly request that while not allowed to go in command of the expedition I may be permitted to serve with my regiment in the field. I appeal to you as a soldier to spare me the humiliation of seeing my regiment march to meet the enemy and I not to share its dangers.

(Signed) G. A. Custer."

" In forwarding the above I wish to say, expressly, that I have no desire whatever to question the orders of the President or of my military superiors. Whether Lieutenant Colonel Custer shall be permitted to accompany the column or not I shall go in command of it. I do not know the reasons upon which the orders given rest ; but if these reasons do not forbid it, Lieutenant Colonel Custer's services would be very valuable with his regiment.

(Signed) Alfred H. Terry,

" Commanding Department."

This was forwarded as indicated through Terry's military superiors and was endorsed by Sheridan as follows :

" Chicago, Illinois, May 7th, 1876.

" Brigadier General E. D. Townsend,

" Washington, D. C.

" The following dispatch from General Terry is respectfully forwarded. I am sorry Lieutenant Colonel Custer did not manifest as much interest in staying at his post to organize and get ready his regiment and the expedition as he now does to accompany it. On a previous occasion in eighteen sixty-eight I asked executive clemency for Colonel Custer to enable him to accompany his regiment against the Indians, and I sincerely hope that if granted this time it may have sufficient effect to prevent him from again attempting to throw discredit upon his profession and his brother officers.

(Signed) " P. H. Sheridan, Lieutenant General."

The result is shown by the following dispatch from Sherman :

" Headquarters of the Army,

" Washington, May 8th, 1876.

" To General A. H. Terry, St. Paul, Minn. :

" General Sheridan's enclosing yours of yesterday touching General

Custer's urgent request to go under your command with his regiment has been submitted to the President, who sent me word that if you want General Custer along he withdraws his objections. Advise Custer to be prudent, not to take along any newspaper men, who always make mischief, and to abstain from personalities in the future. * * *

(Signed) "W. T. SHERMAN,

"General."

The result of Terry's intercession (hardly of Terry and Sheridan's—as Fry states it) and of his determination to take him "along" was communicated to Custer by General Terry on the morning of May 8th at the headquarters of the Department of Dakota, corner of Wabashaw and 4th Streets, St. Paul, Minn.

From this interview Custer proceeded to his hotel—the Metropolitan—a few blocks away, and en route he encountered Colonel Ludlow of the Engineer Corps of the U. S. Army. To this officer he related the fact that he was restored to the command of his regiment and was to accompany General Terry's column, and added a statement that his purpose would be at the first chance in the campaign to "cut loose from (and make his operations independent of) General Terry during the summer"; that he had "got away with Stanley and would be able to swing clear of Terry."

Under the peculiar circumstances, this announcement could not have been made earlier than late in the morning of the 8th. Ludlow repeated Custer's remarks to Colonel Farquhar, Corps of Engineers, U. S. A., General Ruggles, A. A. G., U. S. A., and General Card, Chief Quartermaster of the Department, not later than 10 A. M. on the morning of the 9th. Terry, with his staff and Custer, had taken an early train that morning for Fort Lincoln to join the mobilized troops. Ludlow's purpose was that this information should be conveyed to General Terry, and General Ruggles fully intended to communicate it, and still thinks that he wrote a letter giving the information. But whether it escaped his mind in the great press of public business in his office, or the letter was lost en route to its destination, after trustworthy and regular means of communication were cut off, has not been and probably never will be determined.

Colonel Ludlow had just been ordered to Philadelphia and his position on the staff was taken by Lieutenant Maguire. It thus happened that the above-mentioned announcement of the intention did not come to the knowledge of Terry until his return to St. Paul the last of September, and until then Colonel Ludlow

was not called upon to remember the exact words which Custer used, and, while these exact words may have faded from his memory, the idea conveyed to him was still perfectly clear and was given by him, as above quoted, in a letter to General Terry.

All of these officers agree as to the character of the remark made by Custer to Ludlow as given within a few hours after it was made.

Such a statement, made at that time by Custer to a brother officer, has very significant relation to subsequent events.

Setting aside the revelation which it makes of his ingratitude to the man to whose kindness he had just owed his restoration to command, which is not under consideration, it goes far to explain his conduct on the first occasion when he got the chance "to swing clear of Terry." To this relation of it I will revert later.

Terry, accompanied by his staff and Custer, arrived at Fort Lincoln on the night of the 10th, assumed command of the mobilized column on the 14th, and marched out with it on the 17th.

It is not necessary to discuss the intermediate events of the campaign until the time immediately preceding the massacre. But it is best at this point to correct statements made by Fry.

From Sherman's report he quotes: "Up to the moment of Custer's defeat, there was nothing, official or private, to justify an officer to expect that any detachment would encounter more than 500 or 800 warriors," and otherwise asserts that everybody greatly underestimated the Indian strength.

That the strength finally found was greater than was believed possible is true, but that the disparity was such as Sherman asserts and Fry states is far from the fact.

As early as February 16th Terry wrote Division Headquarters as follows:

"I earnestly request that the three companies of the 7th Cavalry now serving in the Department of the Gulf may be ordered to rejoin their regiment in this department. The orders which have been given recently render indispensably necessary a larger mounted force than the nine companies of the 7th now in this department. These nine companies comprise but six hundred and twenty men all told, and of these not over five hundred and fifty could be put into the field for active operations. This number is not sufficient for the end in view. For if the Indians who pass the winter in the Yellowstone and Powder rivers country should be found gathered in one camp, or in contiguous camps (and they usually are so gathered) they could not be attacked by that number without great risk of defeat. * * *

Finally these companies were sent him.

At this date Terry believed Sitting Bull's personal following to be about five hundred lodges, which means many more than that number of fighting men. He and every one else familiar with the matter, knew that Sitting Bull was only one of the many disaffected chiefs, each with his personal following or band, and that, with the first opening of spring, important accessions of young, ambitious, restless bucks would be received from the agencies on the Missouri. Such telegrams as the following, sent by Terry to Division Headquarters on Christmas eve, 1875, were familiar to all concerned in those days :

"Capt. Poland telegraphs that, although there is no game in the vicinity, the Indians at Standing Rock are selling all their hides for ammunition. These Indians are closely connected with Sitting Bull's band, and, having in view the recent conversation of the Lieutenant General with me, and the communication of the Interior Department to the War Department, which was referred to me on the 20th instant, I have ordered Poland to put a stop to such sales. I suggest that the Interior Department be requested to give similar orders to the trader."

March 24th, Terry telegraphed Sheridan again urgently asking for the troops in Louisiana, and added :

"The most trustworthy scout on the Missouri recently in hostile camp reports not less than two thousand lodges and that the Indians are loaded down with ammunition."

April 1st, Custer telegraphed the report of scout Reynolds that

"From three hundred to six hundred lodges under Sitting Bull are now en route to Berthold."*

May 14th, Terry, on the eve of starting, telegraphed Sheridan from Fort Lincoln :

"It is represented that they have fifteen hundred lodges, are confident and intend making a stand."

While the following was not in Terry's possession before the fight, it seems to show that Sheridan had confirmation of Terry's last dispatch to him from Fort A. Lincoln :

"Chicago, June 6th.

"Courier from Red Cloud agency reported at Laramie yesterday that Yellow Robe arrived at agency (six days from hostile camp). He says that

* NOTE.—Scout Reynolds had been sent by Custer to ascertain the situation with orders to report to him personally, hence the report had gone to Custer in Washington.

eighteen hundred lodges* were on the Rosebud and about to leave for Powder river, below the point of Crazy Horse's fight, and says they will fight and have about three thousand warriors. This is sent for your information.

(Signed) "M. V. SHERIDAN."

All this shows that no such ridiculously inadequate estimate of the number as "500 to 800 warriors" was in the minds of the responsible heads, and wholly negatives the statement from Sherman, quoted and relied upon by Fry. Had the latter possessed even the small knowledge of Indian matters which he discredits Terry with possessing, he would not have allowed himself to be betrayed by Sherman's statement (which was made when discussing another matter, and apparently without a full consideration of the facts), and would have been sure that Terry was always fully aware that his troops were dealing not only with hostiles estimated at from 500 to 800, but with the available part of the agency Indians, who had gone out to help their friends in a fight.

According to Godfrey, Custer himself stated in terms that they would have to face three times that number.

That General Custer was made aware of the unprecedented size of the Indian village before leaving the divide between the Rosebud and the Little Big Horn is quite certain. Captain Hare, 7th Cavalry, who was on duty with the scouts, says: "I heard Mitch Bouyer myself tell General Custer that it was the largest village that had ever collected in the Northwest, and that he, Bouyer, had been with those Indians for many years, over thirty I think he said." This was after Mitch Bouyer, *et al*, had shown Custer the enormous pony herd from the Crow's Nest, and before he, Custer, had divided his command.

As the question of the number of warriors in the hostile camp has been raised, it may not be amiss to recall an incident that took place on the hill, on which Reno took refuge, within a few minutes after General Terry's arrival. He and some of the

* This telegram is the only one to which I can trace Godfrey's statement that "Information was dispatched from General Sheridan that *from one agency alone* about eighteen hundred lodges had set out to join the hostile camp; but that information did not reach General Terry until several days after the battle." It can be seen that this telegram fails to support the statement, and I can find no other that will justify it in any degree. In this Sheridan speaks of the united hostile camp, and not of deserters from agencies, or "from one agency alone." It is utter nonsense to intimate that General Sheridan considered it possible that eighteen hundred lodges had set out from any one agency to join the hostiles.

officers of his staff were surrounded by a group of officers of the 7th Cavalry amongst whom were Major Reno, Colonel Benteen, Colonel Weir and Major Moylan,—all officers of long and varied experience in the army. General Terry put the direct question to them: "What is your estimate of the number of the Indian warriors?" The replies pivoted about the figure 1500, and I can recall Colonel Benteen's reply almost verbatim which was as follows: "I have been accustomed to seeing divisions of cavalry during the war, and from my observations I would say that there were from fifteen to eighteen hundred warriors." No one in the group at that time, put this estimate above eighteen hundred.

The gist of this discussion, however, is found in Fry's attempt to controvert the statement that "Custer's fatal movement was in direct violation of orders." In attempting this he begins with an assumption which has no warrant whatever, and which is plainly contradicted by facts. Fry says: "But it is highly probable that the 'plan' when Custer moved had neither the force nor importance which it subsequently acquired in Terry's mind." In support of this pure assumption, Fry points out that Terry's "full and explicit report June 27th when the subject was fresh, in which he spoke of the conference but did not say or intimate that a plan of operations had been decided upon in it," and that it was "not until July 2d that he reported the existence of a plan."

The history of these two reports is and has been well known for many years, and if Fry did not know the facts, it certainly was not because they were not public property.

In brief, that history is as follows: The report of June 27th was written by General Terry on the field immediately upon his getting a full knowledge of the facts of the disaster. It was sent with all possible speed by a special courier ("Muggins" Taylor) to Fort Ellis and Bozeman, Montana (the latter being the nearest telegraph station, and supposed to be the quickest mode of communication), to be sent from the first point at which the telegraph line in operation might be reached.* The dispatch was written late in the day, June 27th, when all the horrors of the disaster had fully appeared to him. Before sending it, Terry read it to a group of his staff officers by the light of a candle. It is within the knowledge of Captain (now Major) H. J. Now-

* The line was frequently broken in those days by buffalo rubbing down the poles.

lan, 7th Cavalry, and myself, as two of the members who made up that group,* that, after hearing it read, there was a spontaneous and earnest protest made by the assembled officers against excluding the fact that disobedience had occurred and had caused the miscarriage of a well considered plan that promised a great success, and that the failure of the campaign was fairly attributable to this want of loyalty in one of his subordinates.

Fry characterizes this report as "full and explicit," and, on Terry's omission to make any mention in it of the plan, and of Custer's disobedience, he bases much of what he says to Terry's discredit about the plan's being an after-thought. I will return to this point later, only wishing now to say this:

This report was as "full and explicit" as was consistent with General Terry's purpose, avowed at the time, and adhered to in spite of the remonstrances of his staff officers, that he would not give to the public the fact that Custer had flagrantly disobeyed, but would rather himself "bear an imputation hurtful to his military reputation."

After dispatching this report to Lieutenant General Sheridan and in the belief that it would be the first knowledge of the disaster that would reach the outside world, General Terry devoted all his energies and resources to the burial of the dead, care of the wounded and in providing means for, and transporting them to the steamer *Far West*, in order that they might be sent as quickly as possible to Fort Lincoln, many hundred miles away to be covered by very doubtful river navigation.

This once accomplished, and the steamer at the mouth of the Big Horn in readiness to leave under charge of Captain E. W. Smith of his staff, Terry prepared in haste and sent by the hands of Smith the second report—that of July 2d—which was to be transmitted to Lieutenant General Sheridan from Bismarck, which was the first point at which he could reach a telegraph line. One very important fact must not be overlooked: This second report (of July 2d) was distinctly marked and made "Confidential" by Terry, and the original rough draft of it is in my possession now and doubters can see it for themselves. All necessary precautions were supposed to have been taken to prevent this dispatch from going to the public. By the unanticipated event that the

* But three of the nine officers composing the headquarters group are now living. The third is Lieutenant (now Captain) R. E. Thompson, Signal Corps. I have not inquired whether he was present or not.

telegraph line was down and the special courier who carried the report of June 27th failed to get his dispatch on the wires east of Helena, coupled with the fact that the steamer *Far West* (owing to the energy of Grant Marsh, Master, and the swift current due to the unusual stage of water) made the trip down to Bismarck with unprecedented celerity and success, the "Confidential" report was the first to reach its destination and the first one received from Terry by any one, and contained the earliest authentic information of the events to which it referred. This dispatch was immediately forwarded to General Sheridan and given by him to General Sherman, both of whom were then in Philadelphia, still kept strictly "confidential" and never intended to be otherwise. General Sherman received it in Philadelphia, and wishing to transmit it to the Secretary of War by telegraph, unfortunately entrusted it to a young man whom he supposed to be a proper messenger, but who proved to be an enterprising newspaper reporter who availed himself of the opportunity, copied the dispatch and gave it to the public press. Thus it came about that Terry's self-sacrificing purpose, formed on the field of disaster, and ever after during his life firmly adhered to,—to keep from the public all knowledge of the open disobedience of his dead subordinate, and bear himself all the probable consequent criticism (all the more trying because unjust), was in part defeated, and that result now makes it possible for ill-disposed critics to use the two dispatches to sustain the proposition that the importance of the "plan" was in point of fact an afterthought, a bastard conception originating through a desire on Terry's part to avoid blame. An assumption more at variance with the truth of the matter could hardly be conceived.

That it is absolutely unwarranted is again put beyond question through a letter still existing written by General Terry to his sisters from the mouth of the Rosebud on the evening of June 21st, before Custer's column started. This letter indulges in personalities foreign to the matter in question, and is not reproduced here, but in it he relates the events of the past ten days and then explains his plan, closing the subject with the remark "I have considerable hope that this combined movement may justify the expedition."

This brings us to the examination of the claim that Custer's written orders permitted him to do what he did.

Courtesy of phraseology in an order takes nothing from its

force, and the conditions being found as supposed, and the definite purpose of the commander being certainly known, nothing, save the most dire necessity, will justify the subordinate in departing in any way from his instructions. Even then the subordinate must look for protection against charges of disobedience to the fact that his judgment of the course pursued by him will be sustained and confirmed by other judgments that must pass upon his conduct. Even when some discretion is given to the subordinate to meet unanticipated events in his own way, he is still responsible that the way he takes is in entire accord with the "spirit" of his instructions, and as nearly as may be with the expressed will (desire) of the commander.

Fry italicizes, as if giving full discretion to Custer, the phrase in Terry's order: "*It is, of course, impossible to give you any definite instructions in regard to this movement.*" If this stood by itself it might possibly fairly admit of that construction, but as a matter of fact it is immediately followed by a much more pregnant and definite sentence to which Fry gives no attention whatever, and so may lead the unwary reader to regard it as of no moment, to wit: "*He will, however, indicate to you his own views of what your action should be, and he desires that you should conform to them unless you shall see sufficient reason for departing from them.*"

All military men know that the polite words "he desires," "he thinks," have all the force that can be conveyed in the words "he orders."

It may be well to explain that General Crook with a column of troops was to leave Fort Fetterman about the time General Terry's column would reach the Little Missouri River, which was conceded to be the first stream on which the Indians might possibly be found; that upon reaching that stream, and thereafter, Terry endeavored to sweep the country southward far enough to touch the field of Crook's operations, and thus assure himself that no bands of Indians were left in his rear. Pursuant to this system, Major Reno was detached from the camp on the Powder on the 10th of June with six companies of the 7th Cavalry to examine the Powder River Valley as far up as the mouth of the Little Powder, thence west to the Mizpah, and down that stream to its mouth and down the Tongue to its confluence with the Yellowstone, at which point he would then find General Terry with the balance of the command.

After getting out of range of the Department Commander, Major Reno, in violation of his instructions, bolted straight for the Rosebud, which he struck near its mouth. He found the oft-mentioned trail and followed it for some distance and then returned without having accomplished his mission, which was to ascertain whether there were any Indians on the Powder, Tongue, etc.

Reno did not pursue the trail he found far enough to determine in which direction it finally turned. It was possible, though not considered probable, that it would turn to the eastward. So true was this that we find General Custer instructing the commander of his scouts to watch constantly for trails leading east from the Rosebud. This being the case, it can be readily seen that absolute, or "definite instructions," were not only "impossible," but would have been utterly inconsistent with the situation.

Fry continues: "The order Custer received was to 'proceed up the Rosebud in pursuit of the Indians.' Surely he did not disobey that. Everything else was left to his discretion. As Terry did not wish to hamper Custer's action when nearly in contact with the enemy, and found it impossible to give him precise orders, plainly Custer did not, could not, disobey orders in any blamable sense, and plainly, also, he was expected to come 'in contact with the enemy.'"

In other words, according to Fry's version, the only order Custer had was to "proceed up the Rosebud in pursuit of the Indians." That this is a grave misconception of the facts becomes apparent from an examination of the map in connection with the order.

The Indian encampment was believed to lie to the north of the Big Horn Mountains, east of and near the Big Horn River, in the valley of the Little Big Horn River; but it was considered possible that it was located on the Rotten Grass, which was one day's march further up the Big Horn River. The Big Horn runs almost directly north. The immense snow-fields of the Big Horn Mountains fill all these streams, and during the hot days of early summer a great volume of water pours down them. The incline of the bed of the Big Horn is so great that when the channel is full, as it usually is in the month of June, the stream is practically impassable. It is thus seen that the Indian position could only be approached from the north or east. If a concentrated

attack were made from the north, a line of escape was left open to the eastward. General Terry's "Plan" was for Custer's column, which was the strategic one of his command, to occupy this eastward line and so cut off escape in that direction before the Indians were disturbed, while Gibbon's column closed in from the north. In order to effect this "combined movement," and secure joint action as speedily as possible, it was very important that Gibbon should be informed of the situation at the head of Tullock's Fork, and of Custer's discoveries and consequent movements.

The instructions to Custer are here reproduced *in extenso* :

Camp at Mouth of Rosebud River, Montana Territory,

June 22d, 1876.

Lieutenant-Colonel Custer,

7th Cavalry.

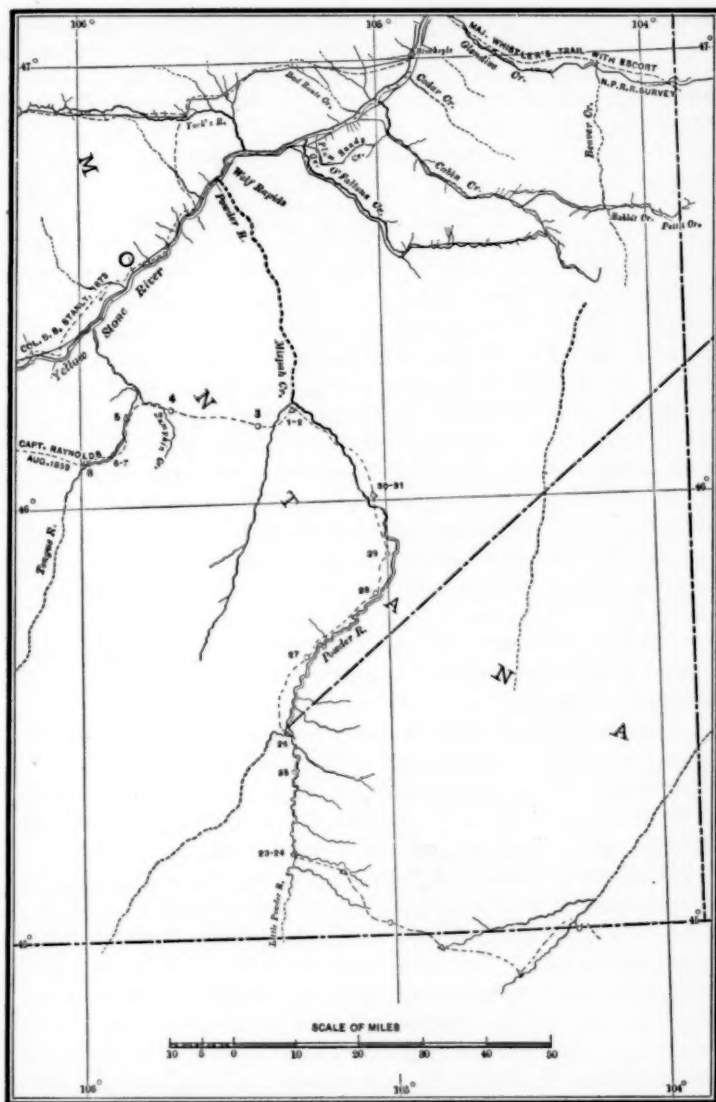
Colonel :

The Brigadier-General Commanding directs that, as soon as your regiment can be made ready for the march, you will proceed up the Rosebud in pursuit of the Indians whose trail was discovered by Major Reno a few days since. It is, of course, impossible to give you any definite instructions in regard to this movement, and were it not impossible to do so the Department Commander places too much confidence in your zeal, energy, and ability to wish to impose upon you precise orders which might hamper your action when nearly in contact with the enemy. He will, however, indicate to you his own views of what your action should be, and he desires that you should conform to them unless you shall see sufficient reasons for departing from them. He thinks that you should proceed up the Rosebud until you ascertain definitely the direction in which the trail above spoken of leads. Should it be found (as it appears almost certain that it will be found) to turn towards the Little Horn,* he thinks that you should still proceed southward, perhaps as far as the headwaters of the Tongue, and then turn towards the Little Horn, feeling constantly, however, to your left, so as to preclude the possibility of the escape of the Indians to the south or southeast by passing around your left flank. The column of Colonel Gibbon is now in motion for the mouth of the Big Horn. As soon as it reaches that point it will cross the Yellowstone and move up at least as far as the forks of the Big and Little Horns. Of course its future movements must be controlled by circumstances as they arise, but it is hoped that the Indians, if upon the Little Horn, may be so nearly inclosed by the two columns that their escape will be impossible.

The Department Commander desires that on your way up the Rosebud you should thoroughly examine the upper part of Tulloch's Creek, and that you should endeavor to send a scout through to Colonel Gibbon's column, with information of the result of your examination. The lower part of this

* At the time this was written, it was not generally understood that the full Indian appellation of this stream was Little Big Horn.

R. P. H.



creek will be examined by a detachment from Colonel Gibbon's command. The supply steamer will be pushed up the Big Horn as far as the forks if the river is found to be navigable for that distance, and the Department Commander, who will accompany the column of Colonel Gibbon, desires you to report to him there not later than the expiration of the time for which your troops are rationed, unless in the meantime you receive further orders.

Very respectfully, your obedient servant,
E. W. Smith,
Captain 18th Infantry,
Acting Assistant Adjutant General."

As Captain Godfrey says, and rightly, "these instructions are explicit, and fixed the location of the Indians very accurately."

In view of all the facts, now so well known, it is difficult to know how Terry could have been more explicit in orders, more definite in purpose, and more clearly prescient of what Custer would find on his march. Subsequent knowledge shows conclusively that Terry's reasoning concerning the movements and locality of the Indians, from such information as he was then able to obtain, was marvellously correct, and that, as will be shown later, the "plan," which was based on the conclusions then drawn, was logically sound and professionally complete, and would, probably, have been crowned with success if it had been loyally adhered to.

It is first to inquire exactly what Custer's orders were, and then to determine how far he was entrusted with discretion to deviate from them.

A concise summary of what was explicit and positive in his orders presents: That Custer was to go up the Rosebud, following the Indian trail discovered by Reno a few days before, until he should ascertain definitely the direction in which it led. Should he find ("as it appears almost certain that it will be found") that the trail turned towards the Little Big Horn, he should still proceed southward perhaps as far south as the headwaters of the Tongue, and then (and not till then) turn towards the Little Big Horn.

Then follows the definite explanation (already well understood by Custer through the conferences held during the afternoon of the 21st) of the coöperative prospective movements of Gibbon's command, and of Terry's hope that thus the Indians, if upon the Little Big Horn, might be so nearly inclosed by the two columns that their escape would be impossible. He was further ordered

that, on the way up the Rosebud, he should thoroughly examine the upper part of Tullock's Creek, and that he should endeavor to send a scout through to Gibbon with the information of the result of this examination. The remainder of the orders is not here in question.

It is not easy to conceive of more explicit orders being given to a detached command, and it will not be pretended by well-informed and trained officers that, in the event of matters being found in the condition anticipated when the orders were given, there can be found one word or hint of authority to depart from them.

Custer's discretion to deviate from them might be exercised :

First. If the condition of things was found to be essentially different from what Terry believed it to be when he issued his orders.

Second. If Custer should see *sufficient reason* for departing from his orders.

All of the evidence known to exist points conclusively to one fact : That in no single particular was the condition of things, as anticipated by Terry, when making the order, in any way different from the condition found by Custer up to the point when the direction taken by the Indian trail was definitely ascertained. At this point, personal examination demonstrated that the conditions actually existed that Terry had so clearly anticipated, namely : It was found (as it appeared to Terry, "almost certain it would be found"), that the trail turned towards the Little Big Horn. Hence there was nothing in this that warranted any deviation from the order. We thus logically arrive at the second case, that there must be "sufficient reason."

Did it exist?

We look in vain in any narrative of the events, we apply in vain to any one having knowledge of the controlling facts, for any reason for departing from the order at this point. Still less is there a scintilla of evidence of any "sufficient reason" for such a deviation from the order as to completely change Terry's plan, and, as the event showed, make the plan impossible.

Exactly what was found to be true, Terry had anticipated would be found to be true! and in that event Custer was left in no doubt what Terry intended he should do, and with no discretion to do otherwise than as ordered—"still proceed southward, perhaps as far as the headwaters of the Tongue," and, at this

critical point, exactly what Terry did not want done, was done, and, instead of "still continuing southward," the trail of the Indians was followed directly to the village, and with such extraordinary haste that there can be no reasonable doubt that Custer had deliberately formed the purpose to follow the trail and attack the village upon reaching it, regardless of where Gibbon's column might be, and without considering that force as a factor in the action!

To an officer of experience, the phraseology that "The Department Commander does not wish to impose upon you precise orders which might hamper your action when nearly in contact with the enemy" can bear no doubtful meaning. Custer was not nearly in contact with the enemy (did not have any knowledge whatever, beyond what was known at the time of his conference with Terry, of the location, or distance to his camp) when, at a point forty miles away from the village, finding the trail turning, as was expected, towards the Little Big Horn, he deliberately followed it instead of going still southward, and so making impossible of accomplishment the hope of Terry, "that the Indians, if upon the Little Horn, may be so nearly inclosed by the two columns that their escape will be impossible." Nor could Custer fail to know that by no possibility could Gibbon be in the position Terry's order contemplated by the time he (Custer) should stir up the Indians to flight or fight, unless, indeed, information of the course of action he had determined to pursue had been dispatched to Gibbon *instantly* (the 24th) and reached Gibbon's camp on Tullock's Creek by midnight.

With such information, and an intimation of urgency, it would have been possible for Gibbon at the head of his veteran 2d and 7th to appear on the field of action by the afternoon of the 25th. Instead of leaving the course of the Tullock and making a most arduous and exhausting march to the Big Horn, Gibbon could then have continued up the Tullock, over a fair route, directly to the Indian village.

Before moving from the mouth of the Rosebud six selected Crow scouts were detached from Gibbon's command, ferried across the Yellowstone, and assigned to Custer, for the special purpose of meeting just such a contingency. They were to act as a medium of communication between the two commands, and it was most specially impressed upon Custer by Terry himself, that, in taking these scouts from Gibbon, who had but twenty-

five, while Custer already had forty, they were really for the service of Gibbon's command.

One of the most important of the duties to which Terry directed Custer to apply these scouts was to send word by some of them of the location of the Indian encampment immediately after having certainly determined it. In point of fact three of them were the bearers of that information, but they were not then acting as scouts, but as fugitives, and they started *after* the fight instead of *before* it.

That Custer had determined early in the evening of the 24th to follow the trail leading to the Little Big Horn is clearly shown by a transaction between himself and Captain Varnum, 7th Cavalry, who commanded his scouts. It is best to give this in Captain Varnum's own words:

"We got into camp about dark and I was skirmishing for grub, being pretty well tired out. Custer came to our camp (the scouts) and sat down, holding a confab in the brush with the Crow scouts. Custer then explained to me that the Crows said that on the divide between the Little Horn and the Rosebud there was a high hill with a crow's nest in it where the Crows went when they tried to steal horses from the Sioux. That when it became daylight they could tell by the rising of the smoke whether there were Indians on the Little Big Horn or not. He wanted some intelligent white man to go with these Crows and get from them what they saw and send back word to him. I told him I supposed that meant me, and it ended in my going. I took with me Charles Reynolds, Mich Bouyer, five Crows and eight or ten Rees. Custer said he would move at 11 o'clock at night; I was to go at nine. He would go to the base of the mountains where I was to be, and I was to send him a note as early as possible of what I learned. I got to the Crow's Nest about 2:30 A. M., on the 25th, about 25 miles from where I had left Custer. I threw myself down and fell asleep; but in about three quarters of an hour, or an hour, I was waked up. It was then just daylight. The Indians (Crows) wanted me on the bluff above us. I scrambled up. I saw the two Tepees, spoken of so often, on the branch down which we went to the fight. The Indians tried to show me an immense pony herd in the valley of the Little Big Horn. I couldn't see it. They told me to 'look for worms.' In fact my eyes were pretty sore anyway. I had ridden about seventy miles without sleep and my eyesight was not very good for long range. I sat down and wrote a dispatch to Custer and sent it off at about 4:45. Before the Rees left with the message, however, the smoke of some of Custer's camp-fires was seen about ten miles off, possibly not so far. The Crows were angry at Custer for allowing fires under the circumstances. Custer got my message at about 8 o'clock and started soon after and the dust of his column could be plainly seen as soon as he did so, though not his troops."

It is thus seen that the most ordinary precautions against dis-

covery were not taken and indeed the advertisement of his approach was sufficient to excite the indignation of his scouts.

Captain Wallace, 7th Cavalry, in his itinerary of the march states, in speaking of this same camp and time, "General Custer determined to cross the divide that night" (referring to the night of the 24th).

But to come back to our thread. When Custer followed the trail, he knew beyond cavil that the Indians would either flee or fight when he approached them, and unquestionably he knew that in either case Terry had intended that Gibbon should be in position to take part in any event that might arise. Not only did he deliberately disobey Terry's orders, but beyond dispute he knew that in doing so he was neutralizing, or putting Gibbon's command entirely out of the field of action.

That Terry's "plan," as announced at the conference, had the heartily expressed approval of both his principal subordinates is without question. That it was fully comprehended by both is also without question. Under these conditions, no experienced soldier can fail to reach the logical conclusion that, the facts and conclusions upon which it was based being found as expected, and no new and unanticipated conditions arising, there was no choice left to either of them save to follow *strictly* the plan as announced. The duty to "conform" to the expressed "desire" of the commanding general had become absolute.

It is the most specious fallacy to quote Terry's orders as to what Custer might do when nearly in contact with the enemy as justifying antecedent departure from the plan.

Of course, if the plan had been carried out, Custer, at the expected time (the morning of the 26th—not the morning of the 25th) would have found himself "nearly in contact with the enemy," and of course would have had to determine upon such action as the facts then found should demand, but still unquestionably bound to his chief and to the coöperating column by the terms of the previous mutual understanding at the conference. And this liberty to act alone, and to this extent, and no more, would be understood by any loyal subordinate, acting in good faith toward his commander and a coöperating column.

That the purpose of disobedience was entertained by Custer is evinced by another fact, viz.:

He was ordered (and in this no discretion whatever was given him) on his way up the Rosebud, to *thoroughly* examine the

upper part of Tullock's Creek, and endeavor to send a scout through to Gibbon's column with the information thus obtained. General Gibbon's quartermaster Lieut. (now Major) Jacobs, employed a scout by the name of Hernandeen for this special purpose. He was sent with Custer's scouts for no other object, but his services were not made use of.

There is a serious ambiguity, which might lead to misconception, in Fry's statement that "Captain Godfrey says that a scout named Hernandeen was selected for this service and he is of the opinion that General Custer would have sent him during the day if the fight had been delayed until early next morning as he at first intended." Selected by whom? Not, as might be inferred, by Custer, but really by General Terry before leaving the Yellowstone. Captain Hare, 7th Cavalry, writes of this as follows "I had Hernandeen with me on the morning of the 25th, and he went into the fight with me. No orders were given me to send him on any detached duty, although he told me that he had expected to carry dispatches."

Godfrey also says: "The scouts, who seemed to be doing their work thoroughly, giving special attention to the right, toward Tullock's Creek, the valley of which was in general view from the divide." This is certainly an error. The distance between the valleys of the Rosebud and Tullock's Fork is too great for such observation. I do not know the source of Captain Godfrey's information, but Lieut. Varnum (now captain), 7th Cavalry, was in command of all the scouts, and necessarily entirely familiar with all the duties required of them and of what they did. He says that in all his instructions from Custer in regard to scouting he never even heard of Tullock's Creek, but was instructed to devote special attention to the opposite side, and that, if any examination whatever was made of the Tullock Valley, it was made without his knowledge and by some one not under his control. No one has been found who made any such examination and the fact that no attempt was made to send scout Hernandeen through to Gibbon's column is conclusive that this part of the order was absolutely ignored.

Fry admits that Custer did not examine the upper part of Tullock's Creek, but tosses the whole matter aside as colorless, because there were no Indians there and that nothing concerning Tullock's Creek is material in the campaign. As a part of the disobedience, as an important part in that no scout was sent to Gib-

bon, and as a clear index to the ultimate purpose, it is very far from colorless or unimportant.

Why should that order have been ignored if Custer had intended that Gibbon, and Terry, who was with Gibbon's command, should have information of his movements? Clearly he did not so intend, and certainly this was in entire accord with the purpose he had in contemplation when in St. Paul, and which, on this, the first opportunity which had occurred, he so fatally carried out—to "cut loose from Terry at the first chance."

But even this grave disobedience is swallowed up in the magnitude of that which General Fry has attempted to defend, and which involved not only the fate of a campaign, but the fate of almost a regiment of as gallant and loyal men as ever went into battle.

A well-matured plan, based on reasonable conclusions from known facts, contemplating the cooperative action of two bodies of troops, intending to bring them into joint action at a specific date and place,—the purpose explained not alone in the written orders, but in full conference of all the commanders—is defeated by the failure of one column to carry out its assigned share, and this failure not caused by unforeseen conditions found to exist by its commander, while in its execution, but because he followed the trail directly, which he was certainly "desirea," if not actually forbidden NOT to do, and arrived at the point of coöperation thirty-six hours in advance of the appointed time.

In this there was willful disobedience, and there was hardly less culpable neglect of duty in the fact that no attempt was made to send to Terry, whose position was known and easily reached, one word of information that the whole plan of the march of that column was changed and that it would be on the appointed ground on the morning of the 25th instead of the afternoon of the 26th.

Before quitting this feature of the case, let us see how General Gibbon put himself on record on this subject. In transmitting the map of his itineraryist, from Fort Shaw, M. T., November 6th, 1876, he writes as follows:

"So great was my fear that Custer's zeal would carry him forward too rapidly that the last thing I said to him when bidding him good bye after his regiment had filed past you when starting on his march was, 'Now, Custer, don't be greedy, but wait for us.' He replied gaily, as with a wave of his hand he dashed off to follow his regiment, 'No, I will not.' Poor fellow! Knowing what we do now, and what an effect a fresh Indian trail

seemed to have had upon him, *perhaps we were expecting too much to anticipate a forbearance on his part which would have rendered cooperation of the two columns practicable.**

"Except so far as to draw profit from past experience it is perhaps useless to speculate as to what would have been the result had your plan, as originally agreed upon, been carried out. But I cannot help reflecting that in that case my column, supposing the Indian camp to have remained where it was when Custer struck it, would have been the first to reach it, that with our infantry and Gatling guns we should have been able to take care of ourselves, even though numbering only about two-thirds of Custer's force, and that, with six hundred cavalry in the neighborhood, led as only Custer could lead it, the result to the Indians would have been very different from what it was. * * *

But to continue, Fry says: "The utter failure of our campaign was due to underestimating the number and prowess of the enemy," and, in this, he quotes Gibbon (but only in part) and wholly fails to distinguish between a "check" and such a disaster as the massacre of five troops of cavalry.

Crook had had a "check," but no massacre, and even the remainder of Custer's column was able to hold out against the victory flushed Indians until Terry and Gibbon came up. Then, notwithstanding the fact that this latter force numbered but four hundred men, and the Indian force was practically untouched, they incontinently fled. Is it not easily conceivable that, had Gibbon and Custer been acting together, as Terry had planned, the force would certainly have had no "check," much less an overwhelming disaster, if indeed it failed of a signal victory? Even if Custer's whole body of troops had been together it is most probable that no such disaster could have occurred. Indeed it is well established that, at the inception of Custer's attack, the Indians began packing up and preparing to fly, some of them actually leaving the field, and, doubtless, the signs of this purpose, which Custer could easily observe from the high hills he was on, led him to believe that the village was in full flight, and prompted his hasty and disastrous attack on the village from the north.

It may not be out of place here to quote what the late Lieutenant General P. H. Sheridan has said officially on this subject:

"Had the Seventh Cavalry been kept together it is my belief it would have been able to handle the Indians on the Little Big Horn, and under any circumstances it could have at least defended itself; but separated as it was into three detachments, the Indians had largely the advantage, in addition to their overwhelming numbers."

* The italics are my own. R. H. P.

But for the fact that General Fry's comments, of which the avowed purpose was to show that Custer had not disobeyed, have had injected into them a severe criticism of Terry's military operations and plan, the purpose of this paper would be accomplished. This, however, makes it necessary to discuss the criticism.

Fry thinly veils the spirit underlying his criticisms by crediting Terry with being "one of the best of men and ablest of soldiers." Less than that he could hardly have said of a man of such high ability as a soldier and of such preëminent virtues as a man.

The criticism upon the facts, as Fry states them, falls to the ground in view of the fact that it is not based on what really was the plan and the operations.

Throughout the comments, he assumes that the "plan" (which it is also assumed Terry gave but little thought to at the time) was conceived and concluded at the conference, and that it was the joint work of Terry, Gibbon and Custer. It is spoken of as the "conference plan"—"the plan decided upon in conference"—and to sustain this assumption it is asserted that Terry says in his annual report of 1876 that he "decided upon a plan at the conference of June 21st." He also locates Gibbon's force "some fifteen miles up the Yellowstone nearly opposite the mouth of the Big Horn"; the Rosebud and Big Horn are put "about fifteen miles apart"; and it is left to be inferred that the only facts upon which a plan could be formed was that "a scouting party had found indications that the Indians were on the Big Horn or its tributaries."

It is further asserted that Terry had "about 1000 men on the south bank of the Yellowstone at the mouth of the Rosebud on June 21st"; that "on the night of June 21st Terry held a conference with Gibbon and Custer."

No one of these statements is correct.

From the very beginning Terry planned to employ the cavalry as his strategic and fighting force, holding an infantry support within reach. Until he came into communication with Gibbon's column he had maintained this support with the train and at the supply depot. When he reached the mouth of the Tongue and had brought the two commands into communication he so modified his original plans as to provide in future operations that the two columns should afford mutual support, and depend upon pack-mule transportation.

Terry learned through an Indian of the result of Reno's scout

and approximately, of his whereabouts, at the mouth of the Tongue, late in the evening of June 19th. That night I rode through to Reno's bivouac, which was in the direction of our proposed operations, with orders for him to remain there and rest his men and animals the next day while Custer should bring up the remainder of the 7th, the scouts and Low's battery. On the night of the 20th Custer bivouacked with Reno. After my return to Terry on the night of the 19th, with such information as I had gathered, the maps were gotten out and the general field gone over. A copy of the map then extant of that region accompanies this paper. It will be observed that the Rosebud was an unexplored and unmapped region. (See pages 24 and 25.)

Terry reached Reno's bivouac during the morning of the 20th. After collecting all available information, the measures to be taken were discussed and the "plan" in its general features determined upon, and Custer was told that afternoon of the work laid out for him, and cautioned to husband the forces of his men and animals. The same evening, leaving Custer to bring up this command, Terry proceeded up the Yellowstone on the steamer *Far West*, reaching Gibbon's camp, which was four miles below the mouth of the Rosebud. Before noon of the 21st, Gibbon's column was put in motion up the north bank of the Yellowstone pursuant to Terry's plan, within an hour after he had arrived, and before Custer's command had reached the mouth of the Rosebud on the south side. Thus it will be seen that Gibbon's troops were measuring the road to the mouth of the Big Horn—which they found to be sixty miles instead of fifteen as stated in the "comments"—pursuant to the "plan," before Custer, who was marching, with his command, could possibly take part in the conference.

Custer and command arrived at the Rosebud at about 2 P. M. Soon thereafter the conference was held. After its close, Low's battery was ferried across to the north bank to overtake and join Gibbon's column, and half a dozen Crows were carried to the south side. Thus we see that the command on the south bank of the Yellowstone is reduced to the command that Custer took to the Little Big Horn, which, omitting the scouts, Fry estimates elsewhere at six hundred, which is very nearly correct.

It would naturally be inferred from the statement in the "comments" that Terry's belief that the Indians were on the Little Big Horn was based solely upon the report of a scouting

party which had found "indications," and thus leaves the inference that Terry had no facts from which to reach sound conclusions, and upon which to form a well considered plan. The only scouting party, south of the Yellowstone, had been Reno's, and he reported "heavy Indian trails leading up the Rosebud." But besides this Terry had full information as to the object of this great gathering of Indians, and knowledge of the usual place of assemblage. He also had, before drawing up his letter of instructions, reports from Gibbon's Crow scouts to the effect that they had seen "many smokes" on the Little Big Horn. He had the benefit of the zealous services of such skilled scouts as Mitch Bouyer and Charles Reynolds,—men who thoroughly knew the country and the Indians (the former being one himself), their habits and their accustomed haunts. From all of these facts, Terry had reached the definite conclusions, so well verified later, that the Indians were in large numbers, were together or in contiguous camps, and were either on the Little Big Horn or the Rotten Grass.

It was on these conclusions that Terry's "plan" (his own and not a conference plan) was based and definitely made *before* and not *at* the conference. It was only determined upon after carefully weighing the possibilities of other projects and a free discussion of the situation with members of his staff.

Terry's report of 1876 does not furnish any warrant for the statement that the plan was made at the conference, but, on the contrary, and which is *most decidedly different*, he says, "at the conference I communicated to them the plan of operations which I had decided to adopt."

It is certain, on Terry's authority, that at the conference, he offered, if Custer so wished, to modify his plan and give him (Custer) all of the cavalry (four troops of the old 2d were with Gibbon), but he objected and it was not done. It is possible that some matters of minor detail may have been changed and modified at the conference—and certainly a few changes in the personnel were made—but one thing is perfectly clear: the "plan" came to the conference fully matured in Terry's mind (and it had been outlined to Custer before leaving his camp of the night before) and had to Terry *at that time* all the "force" and "importance" that it ever acquired.

These errors of statement as to position of troops, distances between important points, information as to Indians, and, above

all, misquotations of Terry's official report are all necessary to give a color of probability to the *assumption* that it was a "conference plan," and that to Terry its "force" and "importance" were an afterthought,—which, if it were true, would be as discreditable to his ability as a soldier as to his integrity as a man.

This plan was fully explained by Terry to both Custer and Gibbon on the afternoon of June 21st. That it was perfectly understood by them even Fry does not question. That success would have resulted from following it can only be conjectured as probable, but it can be certainly said that Custer's disaster could not have happened in that event.

It has been shown that the plan was maturely considered, clearly formulated and well understood. Gibbon so states, and Terry's report, which Fry misquotes, leaves it beyond cavil.

This plan, in its detail, was formed immediately after his becoming acquainted with the information which Reno brought back, of the existence and direction of the Indian trail.

That the general features of any specific operations, which might take place if the Indians were found, were already formulated in Terry's mind long before is abundantly indicated in many ways, not alone by his conversations, but such passages as the following from his letter to Gibbon dated as early as February 26th. In this, after many details as to other matters, he says:

"In fact prepare the project of a campaign down the Yellowstone Valley on the theory that Crook is coming up from the south, and that you and Custer must prevent the Sioux from getting away to the northward, and then turn in and help Crook give them a whipping."

In the conversation at the mouth of the Rosebud, when the plan was announced and discussed, Terry said: "It must be assumed that Crook is somewhere in reach along the base of the Big Horn mountains," and later along in the same conversation, "I will not leave the infantry out of the fight."

Now it is plain that the general features of the plan were clear in Terry's mind from the first. He expected to find the Indians about where they were finally found. He expected to find them (as they were finally found) "concentrated in contiguous camps." He expected to find them in such large force that five hundred and fifty cavalry would "run great risk of defeat" in attacking them. He expected to find Crook with his force in position to prevent the escape of the Indians from his own command. In all of these particulars, his anticipations were realized.

How utterly absurd then when he got such further knowledge of the Indians as convinced him that all of his conjectures were right to allege that his "plan" had so little thought, purpose and cohesion that it only assumed importance in his mind *after* the disaster.

The definite plan which was given to Gibbon and Custer was based on Reno's discoveries and on the stated opinions and known facts of such experienced Indian scouts as Bouyer, Reynolds, Gerard and others, who were with him. It contemplated a *joint*, or combined operation of the two columns—not independent movement—and what the final event showed to be of more consequence than all other features, it contemplated taking no chances of defeat by attacking known superiority of force with insufficient means.

It should be noted here that Custer's total force when he left Terry was only about one hundred greater than the five hundred and fifty which Terry had said in February were too few with which to attack "without great risk of defeat."

It is difficult to consider with patience the groundless assumption that Terry had in reality no well-defined plan, and that what he clearly ordered and verbally discussed with Gibbon and Custer only found importance in his mind when disaster had come.

The gist of the plan, as already stated, was to direct the movements of the two columns in such a way that if the Indians fled they could not escape to the southeast without being driven upon Crook; they could not go westward because they were already near the eastern bank of the Big Horn River and the eastern boundary of the territory of the Crow Nation with whom they were in open hostility; northward they would be met by Gibbon, and the Big Horn mountains lie to the southward, in which they could not have maintained themselves for any considerable time if they once permitted themselves to be cooped up in them.

If they made a stand, the purpose is clearly set forth in Terry's report: Custer was to keep on southward (after determining where the trail led), for the double purpose of intercepting flight if it should be attempted, but above all to so manoeuvre his strategic column as to give time for Gibbon's column to come up. This plan was founded on the belief that the two columns might be brought into coöperating distance of each other. Or as Gibbon states it in his letter of November 6th, previously referred to.

"I saw Custer depart on the 22d with his fine regiment fully impressed with the conviction that our chief aim should be to so move that whatever force might be on the Little Big Horn should not escape us. * * * And it was fully understood between us that *to give my troops time to get up, and to guard against escape of the Indians to the South,** he should keep constantly feeling to his left."

It should be borne in mind that these operations were directed against a village community; that the fighting force of this community could not leave their village to go out to attack one of the approaching columns without abandoning their wives, children and property an easy prey to the other.

It must be remembered further that half of Gibbon's force consisted of infantry; that the conditions required that he should take the longest route to the objective, thus making it impossible for him to reach coöperating distance unless Custer manœuvred for delay. It was well understood that Gibbon could not be in place without resorting to forced marches, before the 26th at the earliest, and also well understood that if Custer marched as directed he would, at the same time, be, where it was intended he should be, "in coöperating distance," on the only possible line of retreat if the Indians should run away, while if they held their ground and fought he would be able to make his attack a joint one with Gibbon.

Custer made a forced march and held to the Indian trail instead of moving still southward, and this brought him on the night of the 24th into the position he ought to have occupied on the morning of the 26th, and at least twenty-four hours before Gibbon could possibly be expected to be in place. The fact that Custer did not have any new information concerning the hostile Indians when he began forcing the pace is put beyond question by Capt. Varnum in the letter heretofore quoted.

It is mere sophistry to quote Sherman as saying that "when Custer found himself in the presence of the Indians, he could do nothing but attack" as justification for Custer. That is conceded, but it still remains that Custer had no business to be *at that time* "in the presence of the Indians," and had he not flagrantly disobeyed the plain language and still more flagrantly the perfectly understood purpose and "spirit" of his orders, he *would not have been there.*

It is in no way necessary to discuss the battle tactics adopted

* The italics are mine.—R. P. H.

by Custer when he attacked the village. We leave that to others. What he did when he attacked the villages may have been very judicious, in view of what he then knew and saw. It certainly lacked nothing of his usual boldness. Everything indicates that he was convinced that the Indians were in full flight, and, if this were true, his tactics are not to be criticised.

Mistakes or bad tactics, on his part, at that time, are not under discussion and are of no moment here—the trouble lay in the fact that he found himself where his orders forbade him to be at that time!

As Terry had anticipated in February, the Indians were in one camp, and the force attacking was so small that it not only ran the risk of defeat, but was most disastrously defeated.

There is neither occasion nor disposition here to find fault with what Custer did when he found himself compelled to act *alone* when it had been intended that Gibbon should be practically *with him*. The only criticism I make is that he was not in the place his orders directed him to be.

There must be no confusion between the disobedience which made the disaster possible, and the fact of the disaster itself.

The only reason for speaking here of Custer's battle tactics is found in the fact that even in that Fry attempts to criticise Terry.

Fry's explanation of Custer's battle tactics in detaching Benteen with three troops to the south, as being done "no doubt in deference to Terry's advice," is wholly gratuitous. In all that Terry ordered or advised, there is no thought, expressed or implied, which could be supposed to control Custer's battle tactics. What Custer was to do at the head of the Rosebud, more than a day before the fight, and more than forty miles away from where it finally took place, in case he should find the trail going towards the Little Big Horn, namely, continue southward, can by no possibility be made to apply to his action when he was in face of the enemy.

Whatever was in Custer's mind when he found he must attack—whether he did or did not misjudge what he saw; whether with his information he acted wisely or unwisely in detaching Benteen can never be known. But certainly nothing could be more absurd than to believe that he was influenced in doing so by his instructions from Terry.

It is idle to take such great pains to show that Custer's march was not unduly rapid. This is simply mystifying and leading

away from the real issue, which is not whether Custer reached the Indian village with men and horses exhausted, but whether the march was not in direct defiance of his orders.

Fry says: "The trouble was their strength was underestimated. Terry reported July 2d: 'He (Custer) expressed the utmost confidence he had all the force he could need, and I shared his confidence.'" How unfair and misleading Fry's quotation is is plain in view of the fact that no such condition of things as Custer brought about by his disobedience was contemplated by Terry when he left him. It was not supposed for a moment that he would march directly upon and attack the village so long before it was possible for Gibbon to be in place. It was known that he understood the plan, and that he understood his orders, and it was supposed that he would obey them. For this "understood" purpose Terry believed and agreed with him, that his force was ample. Hence it is of no importance whether the Indians were underestimated or not, for no matter what estimate was made of the Indian numbers, Custer's force was abundant to have enabled him to obey his orders.

It was not ample, as Terry had foreseen, to meet a contingency not contemplated, and which could not have arisen had his orders been adhered to.

We need go no further than the story of what occurred after the annihilation of Custer to make it perfectly clear that his force was ample for all that he was instructed to do. This may be very briefly stated. Reno's attack was a miserable failure, ending in a disorderly rout and a scramble for the hills, where the cool head and noted courage of Benteen saved the two battalions from a disaster even greater than had occurred to Custer. After sweeping Custer's five troops from the field, and encouraged by the victory obtained over Reno's battalion, the Indians swarmed down upon the now assembled force in overwhelming numbers, evidently very confident that it was only a question of a few hours when it too would be forced to submit to the same fate that had befallen the other. But in this they were mistaken. Benteen was a factor they had overlooked, and, notwithstanding the disadvantages of the position, the embarrassments incident to the care of the wounded, total lack of water in the camp, which could be obtained from the river only at possible loss of life, this remnant held out until Gibbon's command came in sight, when the whole body of the Indians abandoned the field.

It may be well to note that Gibbon's command was sighted by the Indians at the very time the "plan" contemplated it would be. Let it be assumed that Custer's command had been maintained intact, fresh and eager for work, led as he could have, and certainly did lead it—with a dauntless courage and a vigorous boldness of attack—and Gibbon with his column of old, war-tried, well-seasoned veterans equally well led,—if both had simultaneously reached their point of combined work and simultaneously advanced against the Indians, is it too much to believe that one of the most brilliant victories over the Indians would have been won?

Plainly the whole event and all its parts show that no wiser or more successful plan could have been devised for bringing the Indians to a contest of strength; no anticipation of unknown events could have been keener or more accurate; no more fruitful possibilities could have been realized. Even in case the very worst had happened and the Indians had fled, they would have been closely followed by Terry's whole force and must have been driven directly into Crook's force, or cooped up in the Big Horn mountains.

In the final paragraph of the "Comments," it is stated: "On the 30th of July a staff officer arrived at Terry's camp with orders for Terry and Crook to unite. After their junction—August 10th—there was much marching but no fighting." The staff officer referred to was General James W. Forsyth, and the "orders" he brought were as follows:

"Brigadier Genl. A. H. Terry,

"Chicago, July 20th, 1876.

"Care of Lieut. Col. Jas. W. Forsyth.

"I send General Forsyth to consult with you. I have made arrangements for the construction of the two posts on the Yellowstone. They are to be similar to Fort Lincoln and everything will be sent to the ground so that all now necessary is to know the points and to have the hostile Indians hit so that we can get a sufficient number of troops to guard the workmen. I therefore advise you to make arrangements to form a junction with General Crook unless you feel strong enough yourself to defeat the hostile Indians, when all your troops are up. We cannot send any more troops nor would it be reasonable to send more if it is at all practicable for Crook and yourself to unite. Colonel Merritt reports that very few if any Indians have left the agencies since Custer's fight. The military posts are to be for six companies of cavalry and five companies of infantry each. In other words will be for the accommodation of two regiments, one of cavalry one of infantry.

(Signed) P. H. Sheridan,

"Lieutenant General."

It is to be noted that, in this letter, the words "I therefore advise" are granted to convey an "order," while it is contended that Terry's "he desires that you should conform" are not an order. The inconsistency need not be remarked upon.

With other matters in which the comments and even Godfrey's article itself might well be the subject of remark, I do not concern myself. My sole purpose here has been to show:

First: That Dr. Munger's remark, to which so much exception was taken, is just and true, and was fully warranted by the facts; and

Second: That the criticism of Terry by Fry, when it is not misapprehension of facts, is an attribution of fault where none existed.

I have very deeply regretted the necessity of saying anything concerning this matter, but being compelled to speak I was not willing to issue anything without making a careful review of the papers in order that I might be fully sustained in what I said by the records, and by the testimony of those who knew, and thus put the facts beyond question. The endeavor has been to let the documents tell the story, and to limit the other work as nearly as might be to indicating simply the proper connection or to such remarks as would insure a perfect understanding.

For reasons before given, this has imposed a long and difficult task upon me, which no feeling of resentment arising from the fact that I was personally assailed would have prompted, and no personal defense would have repaid.

I have been thoroughly conversant all these years with the noble and generous sacrifice, the complete abnegation of self that General Terry knowingly made for the avowed purpose of shielding a dead man from public blame. I have seen him receive thrust after thrust, year after year, on this matter, and quietly ignore it with some such remark as "Blinder Eifer schadet nur." But when this striking example of his main characteristic was cited in his praise at his bier, and I find the facts denied, the sacrifice and consequent suffering scoffed at, and the magnanimous man himself arrogantly and ignorantly criticised and adroitly belittled, both as man and soldier, it becomes a duty to expose facts enough to meet the case.

I have endeavored to limit the field of discussion to simply meeting all aggressive points of attack, and it is only because it seemed necessary, in defense of the memory of an able soldier,

the kindest and noblest-hearted man I have ever known, that I have permitted myself to say what I have.

In no way do I intend or desire to assail General Custer, but it has been forced upon me that his error in disobeying the orders of his superior must be made plain. What reasons he had,—what justification he might have shown, are known to no one living.

As General Terry said in his confidential report of July 2d ;

"I do not tell you this to cast any reflection on Custer. For whatever errors he may have committed he has paid the penalty, and you cannot regret his loss more than I do, but I felt that our plan must have been successful had it been carried out, and I desire you to know the facts."

Prize Essay.

THE ART OF SUPPLYING ARMIES IN THE FIELD AS EXEMPLIFIED DURING THE CIVIL WAR.

BY CAPTAIN HENRY G. SHARPE, SUBSISTENCE DEPARTMENT.

THE art of supplying armies in the field comprises all those means essential to procure the supplies, to store them in depots located at advantageous points, and to transport them to the troops. The methods of operating the lines of communication so as to expedite the transportation of supplies, materials, and troops passing along them, either going to the front or moving to the rear, are also parts of the art of supplying troops in the field.

In war a well organized, armed, and trained force should be always ready to move in any direction and prepared to give battle upon any locality that may have been selected by the commanding general, or to oppose the advance or check a flank movement of the enemy. Mobility is thus a factor of great consequence, and it follows that an army can only be endowed with equipment and supplies up to such an extent as will not impede or hinder this important factor. To make the best possible use of a force in the field it must therefore be provided with efficient and sufficient means of transport and with a practical and well-arranged system of supply.

To provide for the wants of the troops every army has a number of administrative* departments charged with the procurement, custody, and distribution of certain description of supplies which are essential to keep the troops in health and strength, and which provide them at all times with everything that is indispensable for the furtherance of the plan of the campaign. The supply departments in our army are the Quartermaster, Subsistence, Ordnance, Pay and Medical Departments. †

* "Men brought together in large numbers have wants; the talent to satisfy these with order, economy, and intelligence, forms the science of administration." (Marmont.)

† The duties of the different supply departments, as prescribed by laws in force

The work performed by the administrative departments of an army is divided into two distinct and separate spheres of action : 1st, the service performed in rear of the army ; and 2d, that whose province is confined to the troops in the field. These two services are entirely separate but work in conjunction with each other to carry out the main object for which they are created,—the supply and maintenance of the army.

SUPPLY SERVICE WORKING AT THE REAR.

The service in rear has two distinct duties to perform ; 1st, the procurement and custody ; 2d, transportation and distribution. The supplies are procured or manufactured in the national territory, or abroad, and experience proves that in order that the procurement should be more successful it should be located permanently in some place remote from the theatre of war, because it is only at a distance from such locality that commerce is able to be entered upon with advantage. These reserve supplies that are accumulated by the service in rear are intended to replace those carried with the army, and are located in such parts of the national country as are most accessible to the fields of operation, and such section of the country or place is known as the base of operations of the army.*

The base of operations of an army being that portion of a country from which it obtains its reinforcement and supplies, its selection necessarily has an influence upon the strategy of a campaign. Jomini says that it is a principle to establish the base upon those points where it can be sustained by all the resources of the country, and at the same time provide a safe retreat for the army. The dependence of an army upon its base of operations increases in proportion with its size and, therefore, the influence of the base on the operations of an army is magnified as the numbers of the same are increased.

during the war, are set forth in the following sections of the Revised Statutes, U. S., viz. :

Section 1133—Quartermaster's Department.

"	1141—Subsistence	"
"	1164—Ordnance	"
"	1188—Pay	"

And an Act passed in the 2d Session of the 37th Congress and approved April 16, 1862, prescribed the duties of the Medical Department.

* "The base of operations is most generally that of supply." (Jomini.)

"The base of operations of an army is composed of the country which it covers, which furnishes its wants, which sends to it every day the supplies of every kind which it consumes,—and which receives its sick and wounded, etc." (Marmont.)

"The value of a base of operations will seldom determine the choice of an undertaking in the first instance. Mere difficulties which may present themselves in this respect must be put side by side and compared with other means actually at our command; obstacles of this nature often vanish before the force of decisive victories." *

While the selection of a base of operations should not, in general, interfere with the plan of campaign, the location and configuration of a base will affect the readiness with which the supplies can be procured and forwarded to an army. A base should rest on many points, as it is both difficult and dangerous to collect all the supplies in one depot.

The extent of the Federal base gave its armies an advantage; not only had they a variety of lines of invasion to select from, but when defeated in Virginia it was almost hopeless to attempt to intercept them. In 1862, Jackson's flanking movement cut off Pope from the upper Potomac but could not prevent him from reaching Alexandria, and if cut off from Alexandria he could still have retreated on Aquia and the flotilla. And in 1863, when Grant was baffled on the line of the Rapidan he changed his base as he moved around Lee's right successively to the Pamunkey and to the James.

The supremacy at sea, and the fact that the theatre of war was largely bounded by coast line, gave the Federal Government an immense advantage. The capture of the forts at Hatteras Inlet, of Roanoke Island, Newberne, New Orleans, Fort Fisher, and Fort Pickens, the Peninsula Campaign, and the supply of the armies operating against Richmond in Grant's campaigns, were feasible mainly because of the Government's supremacy at sea.

The facility of procuring the supplies depends upon the richness and financial resources of the country and the number of men available to raise the crops and prepare the needed supplies. During the Civil War the population of the North was largely in excess of that of the South, and while it was first considered that the slaves at the South would prove a source of anxiety and apprehension, it turned out actually that they were trusted to take care of the families where the able bodied white men had gone to the war, and they never betrayed their trust. They were largely engaged in building fortifications, and raised the crops

* Von Clausewitz.

upon which the entire South subsisted during the whole war. Both sides had to depend to a considerable extent on Europe for supplies of arms and ammunition. This was, of course, more true of the South than of the North for the principal arsenals for the manufacture of arms were situated in the Northern States, but it was very much easier for the North to obtain the importations than it was for the South, as vessels containing the cargoes were obliged to run the blockade and were often captured when they attempted it.

The South, at the commencement of the war, was able to draw upon the supplies stored in the arsenals located in that section, and which had been "well stocked by the provident treason of Buchanan's Minister of War."* But when these resources were exhausted, replacement was difficult, the blockade having been established, though extraordinary efforts to manufacture the military supplies were made.

The Confederate government enacted a law providing that a certain portion of the cargo of every vessel entering its ports must consist of arms or ammunition, otherwise vessel and all would be confiscated. This insured a constant supply; and though the soldiers were often barefoot, ragged, and hungry, they never lacked arms, nor were they defeated for want of ammunition.

Procuration.

The principal points of supply for the Federal armies for the supplies furnished by the Quartermaster's and Subsistence Departments, were in the cities of Boston, New York, Philadelphia, Baltimore, Washington, Cincinnati, Louisville, St. Louis, Chicago, New Orleans, and San Francisco, and in each of these cities there were one or more officers in charge of the depot belonging to each department, provided with ample force of clerks, laborers and mechanics. There were large establishments at Cincinnati, Louisville, Jeffersonville, and Alexandria, in which hard and soft bread were baked by the Subsistence Department, but the greater part of the bread supplied was furnished from New York, Baltimore and St. Louis. There were also large pork packing establishments located at Louisville, Ky., operated by the Subsistence Department.

The principal depots for the purchase and manufacture of clothing were at Philadelphia, New York, Boston, Cincinnati,

* Goldwin Smith—"The United States."—Mr. Floyd.

Louisville, Indianapolis, St. Louis, Detroit, and at Springfield, Ills. When the Rebellion first compelled the Government to call out a large force the stock of clothing on hand in the depots, being intended only for the supply of the regular army, about thirteen thousand strong, was inconsiderable. The manufacture of cloth for army clothing was engaged in by few factories throughout the country and the stock of clothing was at once exhausted; there was also great scarcity of suitable blankets and undergarments.* The troops being received generally through State authorities these authorities were engaged to assist the Quartermaster's Department to provide the necessary supplies. Large importations were made by merchants, and the goods thus imported were bought by the State authorities and by the Quartermaster's Department, and manufactured by contract, or in the establishments of the Department, into clothing.

A very large proportion of the ordnance supplies was manufactured in the arsenals, foundries and armories throughout the North, of which there were twenty eight in number. The most important ones were located upon railroads or water ways. Some of these arsenals were devoted to special work, as, for instance, iron gun carriages were manufactured at Fortress Monroe, Va., and Watertown, South Boston. Wood carriages were manufactured at Watertown, Watervliet Troy, N. Y.), Alleghany City, and Washington, D. C. Harness was made at Watertown and Watervliet. The principal repair shops, especially for small arms, were at St. Louis, Mo., and Washington, D. C. Compressed bullets were made in the arsenals at St. Louis, Washington, and Alleghany City, and large quantities were also furnished by private factories. Ammunition was prepared at all the arsenals except that of Fortress Monroe. Guns were cast in the foundries

* " Under these circumstances, and to supply the immediate and absolute necessities of the suffering troops, large quantities of such materials as could be found in the market in the hands of the dealers and manufacturers—materials manufactured for the ordinary clothing of the people—were purchased and made up. In some cases these articles were redyed, of the uniform colors, light and dark indigo blue; but the greater part of the gray, brown, and black cloths purchased were made up in those colors. * *

* * When the troops came in contact with the enemy on thickly wooded fields mistakes occurred. The rebel forces were generally clothed in gray, and our own troops, in some cases, fired into each other. This caused orders to be issued, both by the eastern and western commanders, prohibiting the issue or use of clothing of any but the established uniform colors, light and dark blues." (Report of the Quartermaster-General, November 18, 1862.)

at Pittsburgh, Reading, Cold Spring, South Boston, and Providence. The armory at Harper's Ferry having been destroyed to prevent its occupation and use by the rebels, the Government was compelled to rely upon the single armory at Springfield, and upon private establishments for a supply of arms. The capacity of that armory was largely increased until it was capable of producing several thousand stands of arms per month. The demand for arms caused the establishment of numerous manufactories throughout the Northern States, and these were encouraged by the Government.

Combinations among manufacturers, importers, and agents, for the sale of arms, caused a great advance in prices, and to prevent advantage being taken of the necessities of the Government, the Customs officers were directed to deliver to Government agents all arms and munitions that were imported into the country.

The Ordnance Department likewise furnished all the horse shoes and nails used in the army during the war. The powder was furnished by private manufacturers, the Ordnance Department being charged with the duty of making the necessary proof upon its receipt. The purchase of arms abroad continued until 1863, by which time the manufacturers of Pennsylvania succeeded in furnishing suitable iron and steel for the purpose of manufacturing arms.

Prior to the war the production of minerals at the South was insignificant, in fact the great mineral wealth of that section was not then known; and no manufactories or foundries were situated in that region as the institution of slavery was more particularly concerned with agricultural pursuits, and the South was supplied with machinery and everything that it required from factories and mills in the Northern States. The establishment of the blockade cut off the possibility of supply from European markets and thus compelled the Confederate States to rely upon the ingenuity and skill of their inhabitants to produce the supplies of all kinds required. The iron mines in Georgia and Alabama were operated on an extensive scale and yielded all the iron used in the manufacture of guns and projectiles. The Tredegar works, near Richmond, were the largest iron mills in the South, and at that establishment cannon and projectiles of every calibre were manufactured.

A few of the machines in the Harper's Ferry armory were

saved by the Confederates from the fire and were forwarded to Richmond where they were set up.

Nearly all the Confederate States established such factories as were needed, all of which were eventually placed under the exclusive control of the Confederate government. Shops for the remodelling of old guns and the manufacture of Minié rifles were established at Memphis, New Orleans, Nashville, Gallatin, Richmond and many other places.

At Dahlonega, Georgia, was located the principal powder mill of the rebels; and their factories for percussion caps were in Richmond. At first the cartridge factory was at Memphis but was later moved to Grenada.

All the horses and mules used in the army were purchased by the Quartermaster's Department; in consequence of very decided objections raised by the cavalry officers, a Cavalry Bureau was established in 1863 by General Orders No. 236. This bureau was charged with the organization and equipment of the cavalry forces of the army and with the duty of providing for the mounts and re-mounts of the same. The purchase of all horses for the cavalry service were to be made by the officers of the Quartermaster's Department under the direction of the chief of the Cavalry Bureau, and depots were directed to be established for the reception, organization and discipline of cavalry recruits and new regiments, and for the collection, care and training of cavalry horses, which depots were to be under the control of the Cavalry Bureau. In consequence, there were established by authority of this order, depots at Gisboro', D. C., St. Louis, Mo., Greenville, La., Nashville, Tenn., Harrisburg, Pa., and Wilmington, Delaware. The Gisboro' depot was the principal one for the supply of the armies in the Atlantic States and it occupied a farm of about 625 acres and had a capacity of providing for 30,000 animals at the depot, but not more than about 20,000 were ever on hand there at any one time. During the first nine months of 1864 the supply of horses by the Cavalry Bureau averaged about 500 per diem. The supply of fresh horses to General Sheridan's army during his campaign in the valley of the Shenandoah was at the rate of 150 per diem. Large corrals for the reception of beef cattle were also established at various points, notably at Louisville, Kentucky, which corral could accommodate between 30,000 and 40,000 head; there was likewise a large corral at Alexandria, Va.; and a large herd was kept on what is now the Monument grounds in Washington, D. C.

There are two methods of procuring the supplies required for an army :

1st. By entrusting to contractors the entire work of collecting and delivering them to the troops ; and,

2d. By direct purchases made by designated officers of the supply departments.

In the first method the supply departments simply exercise an administrative scrutiny over the contracts made with various firms or individuals.

The defects of this system are universally acknowledged, and it has been the cause of disastrous failures in every army in which it has been adopted. Under this system the success of the most important military operations is dependent upon men who are subject to no military responsibility ; and it is often to the interest of the contractor to fail at the most critical juncture, when the means of supply become the most difficult and expensive. Contracts are never fulfilled to the letter, and never will be, so long as avarice exists. General Scott said : " The method is believed to be impolitic, and is vicious in time of war ; also liable to many objections in a state of peace. The principal only is known to the War Office, and therefore may be supposed to be free from this objection ; but his deputies and issuing agents are appointed without the concurrence or knowledge of the general or the Government. The deputies or issuing agents are necessarily as well acquainted with the numerical strength of the army to which they are attached, as the Adjutant-General himself. For a bribe they may communicate this intelligence to the enemy, or fail to make issue at some critical moment, and thus defeat the best views and hopes of the Commander-in-chief." From the close of the Revolutionary War until after the close of the War of 1812 " the mode of subsisting the army, by contracts for complete rations, had remained substantially unchanged, but various instrumentalities and combinations of instrumentalities for carrying it into execution, had been adopted. Throughout all these changes the result had been uniformly the same—failure."*

By the second method, the officers of the supply departments purchase either in open market, or after making a contract with dealers for the delivery of the supplies, and upon acceptance the supplies are forwarded by the Government to the places where required. The advantage of this system is that it is possible to

* Barriger.—" Legislative History of the Subsistence Department."

accumulate the supplies in a distant locality without the likelihood of the enemy's hearing of the same and thus obtain information regarding a contemplated movement. Furthermore, by this system it is possible to, in a measure, prevent any combinations on the part of dealers to advance the prices of supplies.

The Army Regulations and Acts of Congress in force during the Civil War required, in general, the purchase of all supplies for the army to be made under contract; and section 16, of an Act approved July 17, 1862, provided that any person who contracted to furnish supplies of any kind or description for the army or navy, should be deemed as a part of the land or naval forces and subject to the rules and regulations for the government of the same. In case such contractor should be found guilty of fraud or wilful neglect of duty, the above cited section provided that he should be punished as the court-martial should direct.

The fresh beef was generally furnished on the hoof, and purchased under contract. During the war the troops on the coast of the Carolinas and also the Gulf posts, including New Orleans, received their fresh beef by shipments of the animals from New York; and Louisville and Nashville were the supply points for the armies operating in that section.

The pay of the army was provided by appropriation made by Congress. The enormous sums which were disbursed during the war necessitated some extraordinary means of the Government's raising the same, as the mere fact of a war of that character tends to diminish very largely the ordinary receipts of the Government.

"Modern warfare, with its principle of an uninterrupted and regardless employment of all competent forces, would scarcely be conceivable without subscription loans, by which loans the requisite funds are procured." *

Congress met at the call of the President on July 4, 1861, and on the 17th passed a bill, for the issue of bonds and treasury notes to the amount of two hundred and fifty million dollars.† It also

* Von der Goltz.—"The Nation in Arms."

† In August, 1861, Secretary of the Treasury Chase, held a conference with several of the principal bankers of New York, Boston, and Philadelphia, to negotiate a National loan, and when it looked as if negotiations might fail the Secretary stated that he would return to Washington and issue notes for circulation, "for it is certain that the war must go on until the rebellion is put down, if we have to put out paper until it takes a thousand dollars to buy a breakfast."

increased the duties on many articles, passed an act for the confiscation of property of rebels, and levied a tax of twenty million dollars, apportioned among the States and Territories. The interest bearing debt of the Government in 1865 was considerably over two thousand millions of dollars.

The Confederate government likewise issued large amounts of paper money which was to be redeemable six months after the ratification of a treaty of peace with the United States. The South early resorted to requisition and confiscation; the unconvertible bank bills which it issued in vast volumes* speedily lost all value, and the Confederate soldiers waived the farce of being paid in them. The South disposed of its bonds among its European friends; and at the close of the war, when, of course, these bonds could not be paid, "their holders were thus fined for abetting, or confiding in a slave power."†

The central depot for the supply of the Medical Department was at Philadelphia, with storehouses at New York, Philadelphia, Baltimore, Cincinnati, Louisville, St. Louis, Memphis, Nashville, Chicago, San Francisco, Hilton Head, Salem, Fortress Monroe, Newbern, New Orleans and Washington. There were in the United States at the termination of the war over two hundred general military hospitals containing 136,894 beds. When the condition of a patient in general hospital was so far improved as to render a relapse improbable, he was sent to a camp of convalescents, of which there were several situated throughout the North, at places from which transportation to the theatres of war was comparatively easy. When the men had entirely recovered their health and strength they were armed and returned to duty in detachments of sufficient force to resist attacks by guerillas.

In preparing supplies for a campaign the following points are to be considered:

1. Their composition.
2. The probable daily consumption, and the number of days' reserve to be accumulated.

* By November, 1864, the Confederacy had issued over four hundred millions of dollars of treasury notes which were selling at sixty to one for specie at the treasury. The supply of specie, February 15, 1864, was but seven hundred and fifty thousand dollars. Bonds and certificates were not salable, taxes were with difficulty collected. (Campbell, Assistant Secretary of War of the Confederate States.)

† Goldwin Smith.

3. Where, and by what date they must be ready.
4. Whence are the supplies to be obtained, and how are they to be conveyed to their destination.
5. How are the expended supplies to be replenished.

During the war the ration was composed as follows : 12 ounces of pork or bacon, or, one pound and four ounces of salt or fresh beef; one pound and six ounces of soft bread or flour, or, one pound of hard bread, or, one pound and four ounces of corn meal; and to every one hundred rations, fifteen pounds of beans or peas, and ten pounds of rice or hominy; ten pounds of green coffee, or, eight pounds of roasted (or roasted and ground) coffee, or, one pound and eight ounces of tea; fifteen pounds of sugar; four quarts of vinegar; one pound and four ounces of adamantine or star candles; four pounds of soap; thirty pounds of potatoes, when practicable, and one quart of molasses. Desiccated compressed potatoes, or desiccated compressed mixed vegetables could be substituted for beans, peas, rice, hominy, or fresh potatoes, at fixed rates.*

* "During the Atlanta campaign we were supplied with all sorts of patent compounds, such as desiccated vegetables, and concentrated milk, meat biscuit, sausages, but somehow the men preferred the simpler and more familiar forms of food, and usually styled these 'desecrated vegetables and consecrated milk.'" (Sherman II. 391.) The method of preserving food products in hermetically sealed tin cans was but little used until after the close of the Civil War; it has now been brought to such perfection that all military authorities agree, preserved and prepared foods and forage must be largely used in the future by armies in the field.

Von der Goltz says: "Provisions which are best, and at the same time, most agreeable to the soldier, are always those that are fresh. * * * But fresh provisions have this disadvantage, that they take up a comparatively large space, that they easily go bad, are difficult to keep, and are difficult to cook. * * * How often does it happen in war that just when the water has begun to boil in the pots, an alarm is raised, and a start must be made. No attempt to cook fresh provisions should be made, unless it is certain that the troops will be undisturbed. Artificially prepared provisions are accordingly, an excellent makeshift. They take up but little room, and are not nearly so heavy as the fresh, so that the soldier can carry far more without being burdened by a greater weight. A handful of compressed coffee squares, or a few bars of compressed soup and vegetables, thrown into the knapsack, do not inconvenience, and in the hour of need they can form refreshment and nutriment for a considerable time. Nothing is required save boiling water, for all the various condiments have been already added to the small bodies. A few minutes are sufficient to prepare them, and their preparation requires no knowledge or especial dexterity. The food remains clean and does not become bad."

Colonel Maurice in his article on "War" in the *Encyclopædia Britannica*, gives, as one of the modern conditions affecting strategy, "the facility afforded for the supply of armies by compressed food and compressed forage."

Von Schellendorf says: "The problem of feeding an army in the field has again

The allowance of clothing was fixed by regulations and the men drew such as was necessary, but were by orders obliged to carry certain articles in their knapsacks; many officers reported the tendency of the men to throw away the knapsacks on the march; and when they were taken off prior to going into battle they were seldom again recovered.

Fuel is one of the most essential of all the supplies required by an army in the field, and on account of its great bulk is very difficult of transportation. In a well wooded country, and when on the march, it is a comparatively easy matter to supply the fuel required solely for cooking purposes, but when the army remains stationary for any length of time the difficulty increases, and when it goes into winter quarters the task becomes one of the greatest importance and the supply most urgent. The theatres of operation during the Civil War were generally well wooded and the troops provided the fuel by their own labor. The fields in the different theatres of operation were generally enclosed by the ordinary "rail" fences, and the order published the early part of the war authorizing the use of the "top" rail of the same for fuel, speedily caused the obliteration of all such landmarks. Troops not in the enemy's country were provided by contract made by the Quartermaster's Department.

The fuel required for the large fleet of ocean steamers was purchased by contract principally at Philadelphia and Pittsburgh, and that required by the steamboats on the Mississippi and tributary rivers, was cut by contract along the banks of those rivers. The freedmen were employed to cut the wood and thus were given much needed occupation and in this way a fund was created sufficient to clothe, feed, and house them.*

The supply of water to troops in the field is sometimes a most difficult problem, and particularly so in a desert country. Under such circumstances arrangements must be made to transport a supply for the men and animals. "It might be possible on an emergency to do without firewood and straw, but water is absolutely necessary. It must be good, sufficient in quantity, and accessible."†

in recent years been facilitated by the use of railways and the partial substitution of preserved for fresh provisions." It must be remembered, however, that canned meats, barrelled pork, bacon, etc., require an increase of transportation, as only cattle on the hoof furnish their own.

* Grant's Memoirs, Vol. I., page 426.

† Clarke.—"Staff Duties."

During the war the troops were enabled to obtain an abundant supply of water from the numerous streams which intersected the country; though the quality was in many instances very bad and was the cause of much sickness, but it was not necessary for any department to arrange for a supply of this most necessary article, except at such enormous establishments as the cavalry depot at *Gisboro', D. C.*

The forage ration was fourteen pounds of hay and twelve pounds of oats, corn or barley. For mules, fourteen pounds of hay and nine pounds of oats, corn or barley.

The supply of small-arm and artillery ammunition must be ample to enable a general engagement being entered into even if the same is brought on unexpectedly.

The daily consumption of supplies will be governed by the number of troops, camp followers and animals to be provided, and whether active operations are undertaken in which general engagements are to be brought on.

"He who, according to directions, calculates the needs of an army in the field by pounds, and provides for it according to the most careful dispositions, certainly will scarcely ever run the risk of a portion of the supplies he has furnished being spoiled. But the army will suffer by this arrangement. Two and three times as much as an army needs must be supplied, if it is to be kept from want; double and treble in respect of the good quality of the provisions, double and treble of the quantity."*

From May 1st until August 12th, 1864, the daily average number of rations forwarded from *Chattanooga* to *Sherman's* army, which numbered about one hundred and five thousand men, was four hundred and twelve thousand—more than three rations for every man that left *Chattanooga* on that campaign.†

Transportation.

The second sub-division of the duties performed by the service acting in rear consists of transportation and distribution. The following are the means of transport which are at various times available for use in forwarding supplies to armies in the field:

1. Railroads.
2. Steamers, sailing vessels, boats by sea, on rivers, lakes or canals.

* *Von der Goltz.*

† *Symonds.*—"Report of a Commissary of Subsistence."

3. Wagons or pack animals on ordinary roads.

Railroads.—The employment of railroads in war tends to increase that important factor of the mobility of the troops. It is fully acknowledged that without their aid it would be next to impossible to supply regularly the large armies that would be employed in wars at the present age.

"In a country with numerous lines of railway and vast quantities of rolling stock ready at hand, there are immense possibilities of attack or defense, provided it possesses competent military force. Great bodies of men and material can be moved over extreme distances at a very brief notice, by a vigorous government, directed by the necessary skill and ability. To make the result of full value, however, both men and material must be on hand in entire readiness and fitted for instant use in advance of the movement."*

When railways pass directly from the national territory into that of the enemy, as was the case during the Civil War, they can carry the resources of the former right through, in which case its territory usually becomes a great base of operations. The facility of transport afforded by railways renders the establishment of great magazines at the junction of important lines a comparatively easy one, "but the same principle as before must govern the selection of points on which to establish magazines, and the direction of the lines of supplies."†

"It is thus evident that railways have become the true military roads of an army, and that their location in the future will have a determining influence on the plans of campaign to be adopted."‡

Early in the war the Government realized the importance of utilizing the railroads for transportation of troops and supplies, and on January 31, 1862, Congress passed an Act which authorized the President, when in his judgment the public safety required it, "to take possession of any or all railway lines in the United States, the rolling stock, their offices, shops, buildings, and all other appendages, and to prescribe rules for using and maintaining, and to extend, repair and build the same in the manner most conducive to the interests of the Government, and to place under military control all officers, agents and employés,

* Holabird.—"Transportation of Troops and Supplies."

† Hamley.—"Operations of War."

‡ Michie.—"American Military Roads and Bridges."

belonging to the lines, so that they shall be considered as a post-road and a part of the military establishment of the United States, subject to all the restrictions imposed by the rules and articles of war." The same act imposed severe penalties on any person resisting or interfering in any manner with the unrestrained use by the Government of such property, and provided further, "that the transportation of troops, munitions of war, etc., throughout the United States, shall be under the immediate control and supervision of the Secretary of War, and all such agents as he may appoint."

On February 11, 1862, by order of the President, a military director and superintendent of railroads in the United States was appointed (D. C. McCallum) with authority to take possession of, hold and use all railways, engines, cars, locomotives, equipments, etc., that were required for the transport of troops, arms, ammunition, and military supplies of the United States. At the time General McCallum assumed his duties indicated above, there was only one railroad in the possession of the Government, that from Washington to Alexandria, which was seven miles long.

It was not found necessary to exercise within the loyal States the power conferred upon the President by law, to take actual military possession of the railroads of the country, but a uniform tariff for Government transportation was made with the officials of the different railroads. Some of the railroads within the theatre of military operations—as the Baltimore and Ohio, the Louisville and Nashville, and the Missouri railroads,—repaired their bridges, restored their track and replaced their rolling stock at their own expense. Others, abandoned by their disloyal owners and managers, were taken possession of, repaired, stocked and managed by the Quartermaster's Department.

As the war progressed, the nature, capacity, and value of railroads were better understood on both sides, and systematic and determined efforts were made against the lines used for transporting supplies for the Federal armies. The destruction of track and bridges was greater each time the roads passed within the enemy's lines, and extraordinary efforts had to be made to meet it.

A small construction corps numbering three hundred was at first formed; this was later enlarged until at the end of the war it numbered nearly ten thousand men. Storehouses were established at principal points with an ample stock of tools and mate-

rials for making needed repairs. This construction corps was at all times prepared for any emergency, either to build bridges of great length and dimensions, or lay miles of track or repair damages done by guerrillas and raiding parties. The attacks on the line in rear of the army were of such frequent occurrence and often of so serious a character that to insure speedy repairs it was necessary to station detachments of the construction corps at various points along the different roads operated and also to collect supplies of construction material, such as iron rails, chairs, spikes, cross ties and bridge timbers, at points where they would be comparatively safe and easily obtained when required.

Seventeen hundred and sixty-nine miles of military railroads*

* I.—THE FOLLOWING ROADS WERE OPERATED IN VIRGINIA :

Name of Line.	Terminal Stations.		Length in Miles.
	From.	To.	
Alexandria and Washington.....	Alexandria,	Washington,	7
Alexandria, Loudon, and Hampshire.....	Alexandria,	Vienna,	15
Orange and Alexandria.....	Alexandria,	Rappahannock,	51
Manassas Gap,	Manassas,	Piedmont,	34
Norfolk and Petersburg.....	Norfolk	Suffolk,	23
Seaboard and Roanoke	Portsmouth	Suffolk,	18
City Point and Army.....	Pitkin Station	Humphrey.	13
Southside.....	City Point	Burkeville,	62
Richmond and Danville.	Manchester	Danville,	140
Winchester and Potomac.....	Harper's Ferry,	Stevenson,	28
Richmond and Petersburg.....	Petersburg,	Manchester,	21
Clover Hill Branch.....	Clover Hill Station,	Coal Mines	18
			430

II.—THE FOLLOWING ROADS WERE OPERATED IN THE DIVISION OF THE MISSISSIPPI.

Name of Line.	Terminal Stations.		Length in Miles.
	From.	To.	
Nashville and Chattanooga.....	Nashville,	Chattanooga	151
Nashville, Decatur, and Stevenson... ..	Nashville,	Stevenson,	200
Nashville and Northwestern.....	Nashville,	Johnsonville,	78
Nashville and Clarksville.....	Nashville,	Clarksville,	62
Shelbyville Branch.....	Wartrace,	Shelbyville,	9
Chattanooga and Knoxville.....	Chattanooga,	Knoxville,	112
Knoxville and Bristol.....	Knoxville,	Carter's Station,	110
Cleveland and Dalton.....	Cleveland,	Dalton,	27
Chattanooga and Atlanta.....	Chattanooga	Atlanta,	136
Rome Branch.....	Kingston,	Rome,	17
Atlanta and Macon.....	Atlanta,	Rough and Ready,	11
Memphis and Charleston	Memphis,	Pocahontas,	75
Mississippi Central.....	Grand Junction,	Tallahatchie river,	48
Mobile and Ohio.....	Columbus, Ky.,	Union City, Tenn.	26

were, during the war, repaired, stocked and operated by the agents of the Quartermaster's Department, under the energetic supervision of General McCallum. In the repair of so many miles of railroads great quantities of iron, burned and twisted by the contending forces, both of which destroyed railroads which they were obliged to abandon, fell into the possession of the Federals. To make this iron serviceable in the repair of the railroads leading to Atlanta and the Gulf, after the capture of Chattanooga, the rolling mill there was completed, and the twisted rails re-rolled at a cost of about fifty dollars per ton; thus effecting an enormous saving as new rails delivered in Chattanooga cost about one hundred and forty-five dollars per ton. The supply of rails for new lines, or extension of old ones, in the eastern portion of the theatre of operations, was obtained by purchase, manufacture, and by taking up lines unnecessary for military purposes in that section.

The celerity with which the Federal forces repaired the roads was marvelous. Early in October 1863, the Orange and Alexandria railroad was thoroughly destroyed by the rebels from Manassas Junction nearly to Brandy Station, about twenty two miles. Repairs were commenced the 23d of October, and, among other works, the Rappahannock river bridge, six hundred and twenty-five feet long and thirty-five feet high, was re-built in nineteen working hours.

During Sherman's advance from Chattanooga to Atlanta at no time were the railroad trains more than five days behind the general commanding. The reconstruction of the bridges over the Etowah and Chattahoochie are unparalleled feats of military construction. The Etowah bridge, 625 feet long and 75 feet high, was rebuilt in six days by six hundred men of the construction corps.

III.—THE FOLLOWING LINES WERE OPERATED IN NORTH CAROLINA.

Terminal Stations. From.	To,	Length in Miles.
Morehead City.....	Goldsborough	85
Wilmington.....	Goldsborough	95
Goldsborough.....	Raleigh.	48

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The only line in Arkansas used for military purposes was a portion of the Memphis and Little Rock Railroad between Duvall's Bluff, on White River, and Little Rock, forty-nine miles long.

The Chattahoochie, 740 feet long and ninety feet high, was rebuilt in four and a half days by the same number of men belonging to the corps. The repairs of the various railroad lines were accomplished so rapidly as to almost justify the statement of a Confederate that "old Sherman carries a *duplicate* tunnel along."^{*}

The principal factors in the transportation of armies and supplies by rail are the following:

1. The capacity of the train.
2. The time necessary for loading.
3. The time interval between trains.
4. The rate of running.
5. Time required in unloading.
6. Number of railways available.

On a railroad which is employed for the transportation of troops and supplies, the ordinary freight and passenger service will be considerably disturbed, and at times even it may be necessary to entirely suppress them.

In April, 1864, when making preparations for the Atlanta campaign, Sherman found the capacity of the railroads from Nashville forward to Decatur, and to Chattanooga, so limited that on April 6th he issued an order[†] restricting the use of the railroad plant to transporting only the essential articles of food, ammunition, and supplies for the army proper, and cutting off all civil traffic. The commanders of posts within thirty miles of Nashville were required to haul the stores for their commands from that place in wagons; the troops forwarded to the front were obliged to march, and the beef cattle were driven in herds.

While a railroad may, during the period of preparing for a campaign, be devoted exclusively to transportation of supplies, when active operations commence, the reverse is frequently the case, as the fighting line needs to be at once and strongly reinforced with men.

When the number of railway lines, which can be used as lines of communication during a campaign, is sufficient, it is advisable to assign each line for the supply of one or more designated corps; where several armies act in conjunction such assignment is particularly desirable whenever it is possible.

When the Armies of the Ohio, Cumberland, and Tennessee were in the vicinity of Chattanooga (from March to May 1864)

^{*} Sherman's Memoirs, II. 151.

[†] G. O., No. 6, Hdqrs. Military Div'n of Miss., April 6, 1864.

preparing for the Atlanta campaign, the supplies were forwarded from Louisville to Nashville by rail and also by the Cumberland River. General Thomas, as commanding-general of the Department of the Cumberland, exercised absolute command and control over the railroads in his department, and the other armies thought that his (General Thomas's) army received more than its share of the supplies and other advantages of the railroads. "I found a good deal of feeling in the Army of the Tennessee on this score and therefore took supreme control of the roads myself, placed all of the army commanders on an equal footing, and gave to each the same control, so far as orders of transportation for men and stores were concerned."*

Water Transport.—While transportation by rail is liable to innumerable interruptions caused by obstruction or destruction of the railroad lines, and is further limited by the number of trains that can be sent over the line in any given time; transports by water, on the other hand, are liable to none of these accidents, except that caused by ice, when once the command of the water course has been secured. There is, moreover, no limit to the capacity of a lake or navigable river so long as there are boats in sufficient number; but a railway, especially a single track railway, may be overcrowded. An ordinary Ohio river steamer carrying both passengers and freight, has a capacity of about five hundred tons. To supply forty thousand men and eighteen thousand animals requires about two hundred and sixty tons daily, therefore, one such steamer would carry supplies for such a force for nearly two days. Jomini says that rivers are excellent lines of supply and powerful auxiliaries in the establishment of good lines of operation, but never the line itself.

The country commanding the sea by its naval force is only limited as to the amount of stores that it can transport by the capacity of the vessels it has at command.†

The demand upon the Quartermaster's Department compelled it to employ not only the fleet which it had gradually acquired by purchase but nearly every new steam vessel built in the United States for ocean traffic.

* Sherman's Memoirs, II. 9.

† The Quartermaster's Department had in charge during the war, for use on the ocean and lakes, 394 vessels having a gross tonnage of 137,006 tons. There were 238 vessels employed on the ocean and lake service owned by the Government, having a tonnage of 165,248 tons.

The steamboats used on the rivers, etc., were either constructed or purchased by the Government, or captured from the enemy, or impressed under military necessity, either from disloyal or loyal owners, or they were chartered at fixed rates. The vessels in all the above cases being sometimes run by crews in direct Government pay, sometimes by individuals under contract with the Government to man, victual, and equip, sometimes run by the crews found on board, whose services were impressed with the vessels, and who were paid by the owners.*

On the 17th of March, 1862, the transportation of the Army of the Potomac to Fortress Monroe for the Peninsula campaign was commenced. 125,000 men, 14,592 animals and 44 batteries of artillery, and the wagons and ambulances, pontoon trains, and enormous equipage, required for an army of such magnitude, were transported in about four hundred steamers and sailing craft. Later, during Grant's campaign against Richmond, a large fleet was constantly employed in supplying the armies and the troops at the various stations along the coast from the Chesapeake to New Orleans.

The greater part of the stores intended for the supply of Sherman's army on the completion of its march to the sea, were sent to Port Royal Harbor, there to await his arrival at some point on the coast of the Carolinas or Georgia, and transports were dispatched to Pensacola with supplies to await the arrival of the troops, in case some unexpected opposition compelled General Sherman to turn his course to the South. When he appeared in the rear of Savannah and captured Fort McAllister by a *coup de main*, and communicated with the naval squadron; the transports were sent around by the Ogeechee and Savannah rivers, and light draught steamers suitable for use on the rivers, which had been dispatched on the first news of his approach, arrived in time to transfer to the river landings the clothing, camp and garrison equipage, quartermaster's stores, forage and provisions which had been sent in sea-going vessels, both sail and steam, and which were of too heavy draught to enter the Ogeechee or Savannah rivers at that time, as obstructions in the channel were not entirely removed.

* There were 119 steamers, 305 barges, and 109 coal drayage boats and railroad floats belonging to the United States on the Mississippi River and its tributaries and at Mobile, Alabama. There were 1750 steamers and other vessels chartered on the Mississippi River and its tributaries by the Quartermaster's Department.

Wagon Transports.—The introduction of steam as a motive power has effected a remarkable change in the water and land transport throughout the world. But even where these improved means of locomotion are plentiful, an army requires, also, other means of transport on account of the constant shifting of direction of military operations, the destruction of railway lines, and the necessity of distributing what the railways, steamboats, and steamships carry in bulk.*

The wagon trains used in the Federal armies during the war were the results of long experience and operations upon the western plains. The wagons and harness were the model so successfully used there in the movements of the troops upon the high and narrow plains at the base of the Rocky Mountains and along the rough defiles of that great chain. Portable forges with boxes of smith's, wheelwright's and saddler's tools accompanied all the larger divisions of the trains, and spare parts of materials for repair were carried with them, thus any ordinary repairs could be made during the night halt.

The experience of the war convinced all officers of the Quartermaster's Department, that for army trains mules† are much superior to horses, and the latter part of the war horses almost entirely disappeared from the trains, being transferred to the cavalry or artillery and replaced by mules.

General Ingalls, the Chief Quartermaster of the armies operating against Richmond, in his report for the fiscal year ending June 30, 1864, says: "I have, during the year, frequently reported my views as to the best and proper means of transportation for an army. I do not think that the kind and amount now furnished these armies could be improved upon. The common six-mule wagon has proved to be the most economical and durable for years past of any ever tested."

In order that the enormous streams of supply may be uninterrupted the wagon roads should be of the best construction, drained, hard and smooth. Up to the time of the Civil War but little attention had been given to the wagon roads throughout the country. The ordinary dirt roads over which the armies

* "Much suffering has been caused by the impossibility of furnishing supplies to the wounded, when those supplies were within a few miles of them in great abundance." (Report of the Surgeon-General, dated November 10, 1862.)

† "This country produces in great abundance, and of the best quality, one of the most valuable animals in the world for purposes of war—the army mule." (Holabird. —"Army Wagon Transportation.")

moved during that war were soon cut up by the heavy traffic to which they were subjected, and in wet weather they became absolutely impassable. General McClellan in his report of the Peninsular campaign tells us: "On the 15th and 16th (May, 1862) the divisions of Franklin, Smith, and Porter, were with great difficulty moved to White House, five miles in advance; so bad was the road that the train of one of these divisions required thirty-six hours to pass over this short distance."

After the battle of Chickamauga the Army of the Cumberland was encamped in and around Chattanooga. Its line of communication, along the south bank of the Tennessee, with its depot at Bridgeport, was broken by the rebels; and furthermore the destruction of the railroad bridge at that place interrupted the communication with Nashville, the base of supply. The wagon trains were thus obliged to move by a circuitous route along the bottom lands of the Tennessee and Sequatchie valleys and then to cross Waldron's Ridge by very steep, narrow, and rough roads. Until the rains commenced the roads were practicable, though difficult; but early in October (1863) they became impassable, and the rebel cavalry, having crossed the Tennessee above Chattanooga, attacked the trains, entangled in the mud of the Sequatchie valley and the rocks of the western slope of Waldron's Ridge, and destroyed about three hundred wagons, and killed or captured eighteen hundred mules.

The roads leading from the main depot of supply of an army to the several corps, divisions, brigades, and other subdivisions of the same, were especially liable to be rendered unserviceable and impassable. To remedy this recourse was had to "corduroying" the roads.

Intimately associated with the maintenance of roads is the bridging of rivers, streams and torrents; as an impassable stream or a swollen torrent may lead to unfortunate results, by delaying the advance of very much needed reinforcements, or of very urgent supplies.

Pontoon trains accompanied all the armies in the Peninsular campaign, and "the pontoons were used in discharging quartermaster and commissary stores at Ship Point; in disembarking General Franklin's command at West Point, and in constructing bridges over Hampton creek, the stream in front of Yorktown, and upper Chickahominy."* "During the year 1863 the pon-

* Michie.

toon trains accompanied the army in all its marches backward and forward through Virginia, frequently bridging the Potomac, Rapidan and Rappahannock. * * * During the campaign of 1864, trains composed of fourteen pontoons and two trestles accompanied each of the three army corps of the Army of the Potomac." *

SUPPLY SERVICE WORKING IN THE FIELD.

In order to insure the continuity of the service of supply for troops in the field, that is to say, the connection between the troops during the operations of war and the centres of production in rear of the army, there are officers, with necessary assistants, belonging to the various departments of supply, attached to each of the different organizations of an army.

On June 24, 1861, General McDowell was authorized to divide his army into brigades and divisions. By an order of the President, dated March 8, 1862, the Army of the Potomac was divided into corps; similar organizations existed in the other Federal armies. Each regiment had an officer with the rank of lieutenant who was charged with the duty of obtaining supplies from the different supply departments for the troops in the regiment. Each brigade consisted of two or more regiments, and had an officer assigned to it from each one of the supply departments, who was designated as brigade quartermaster, commissary, etc., respectively. Such officers received, took charge of, and transferred to the proper officer all property and supplies furnished for the use of the brigade. The brigade quartermaster also had charge of the baggage train, material and animals. Each division consisted of two or more brigades, and had officers known as the division quartermaster, commissary, etc., to perform duties relating to the division similar to those attributed to a brigade. When several divisions were organized into a corps, a chief quartermaster, commissary, etc., were designated; these officers had the general superintendence of the affairs of their departments within the corps. When several corps were united into an army there were officers appointed, designated as chief quartermasters, commissaries, etc., for the army. The Medical service was under the supervision of the medical director, who had one assistant. Each corps had its medical director; each division

* "Organization of the Bridge Equipage of the United States Army."—War Department, 1870.

a chief medical officer; and each regiment one surgeon, two assistant surgeons and a hospital steward. Each of these officers exercised general supervision over the conduct of the officers and agents subordinate to him and within his command. Each received his orders and instructions from the commander of the body of troops to which he was attached, and also from his immediate superior in his own department.

The difficulties of supplying armies in the field are mainly caused by their state of concentration and by their constant change of locality. The supply of an army in the field is dependent upon, first, the resources of the country forming the theatre of operations, in the way of food, forage, transport and communications; second, on the time of year and the climate; third, on the nature of the war, whether offensive or defensive; fourth, on the character, condition, length and number of the lines of communication; fifth, on the rapidity of the movements; sixth, on the propinquity of the enemy and the temper of the inhabitants.

"A general should neglect no means of knowing in advance and in its details, the country in which he is going to make war. He should procure its most accurate statistics; he should know in what its resources of every kind consist. * * * The least negligence in this study may have the gravest consequences." *

At the outbreak of the Civil War there were few if any good maps of the theatre of operations, and the science of statistics had not then received much attention in this country, consequently the knowledge of the resources of the theatre of war was very imperfect. Later on very accurate information was obtained of the location of the various flour mills and other centres of production of food and other supplies.

The Civil War was really a war of conquest and of invasion. "The North, therefore, if it undertook to fight for the reëstablishment of the Union, was forced to commence a war of conquest. No other phrase can so precisely describe the kind of war which the North must prosecute, or else acquiesce in the permanent dissolution of the Union." †

It is easier to provide the supplies when acting on the defensive in one's own country than when engaged in war in the enemy's territory; for regular communications with the depots and magazines can be organized, and if obliged to retire the sur-

* Marmont, page 262.

† Ropes' "Story of the Civil War."

plus stores can be destroyed to prevent them falling into the hands of the enemy. If in an enemy's country the troops remain stationary and the lines of communication are secure and in good working order, the question of supply is comparatively an easy one, but when the troops begin to move the question becomes more complicated in proportion to the rapidity of the movement and the size of the army. Upon the march the extent to which the local resources can be utilized will depend upon the breadth of the march-front and the rate of the movement. The broader the front in this case the easier the supply. When leaving Atlanta Sherman directed that the habitual order of march should be, wherever practicable, by four roads, one for each corps comprising his army, as nearly parallel as possible, and converging at indicated points; this same order of march was adopted in his campaign through the Carolinas, and thus, in both instances, he was able to fully utilize the local resources. The propinquity of the enemy obliges an army to diminish its march-front, prevents the resources of the country from being utilized, and also impedes the supplies being brought from the rear as the trains cannot be brought within easy distance of the troops. If the inhabitants are hostile the task of supplying is most difficult, as, in that case, the population will conceal, carry off, or destroy its own resources, and endeavor to capture and burn the supply trains of the invading army. "There was * * * nothing in the temper of the South to suggest that the war was carried on for the redress of grievances. * * * On the contrary, the attitude of the South was from the beginning one of resistance to the uttermost." * The bitter animosities and burning passions gave rise to the most implacable enmities which raged so at New Orleans and culminated in Washington, in April, 1865, but which it is most devoutly hoped were forever calmed and obliterated by the Message of Peace from Mount McGregor twenty years after.

There are two methods of supplying an army in the field:

1. By consignments of supplies forwarded by the service in rear to an advance depot, and carried from that depot by the supply trains of the army; and,
2. By utilizing the resources of the country.

The supplies an army carries with it may be divided into two classes, those carried by the troops themselves, and those which

* Ropes' "Story of the Civil War," page 4.

are carried in the trains. The quantity of supplies the men can carry is limited not only by the strength of the men but by the rapidity of the movement which is entered upon. The amount of supplies, and, therefore, the size of the trains containing them, are dependent upon the distance of the army from the base or its advance depot.

At the commencement of the war the supplies to be carried by the troops were prescribed in General Orders, which provided that, in ordinary marches where the troops could receive daily issues from the trains they should carry only two days' rations; but in the immediate vicinity of the enemy, and where the exigencies of the service rendered it necessary for the troops to move without baggage or trains, the men were required to carry with them from eight to twelve days' rations,* which were arranged as follows:

For Eight Days.

5 days' beef or mutton to be driven on the hoof or collected in the country passed over.	
3 days' cooked rations in haversack, weight, . . .	5 $\frac{3}{4}$ pounds.
5 days' rations of bread and small stores in knapsack, weight,	6 "
A change of underclothes in knapsack, weight, . . .	2 "
A blanket, weight,	5 $\frac{1}{4}$ "
Total weight,	19 "

For Twelve Days.

9 days' ration of meat on the hoof.	
3 days' cooked rations in haversack, weight, . . .	5 $\frac{3}{4}$ pounds.
9 days' rations of biscuit and small stores in knapsack, weight,	10 $\frac{1}{2}$ "
A change of underclothes in knapsack, weight, . . .	2 "
A blanket, weight,	5 $\frac{1}{4}$ "
Total weight,	23 $\frac{1}{2}$ "

* General Orders No. 7, Headquarters Military Division of the Mississippi, dated April 18, 1864, provided: "II. When troops are ordered to march for action, or to be in condition for action, all encumbrances must be left in store at the most safe and convenient point. Mounted officers (general, regimental or cavalry) will be expected to carry on their own or led horses the necessary bedding and changes of clothing, with forage, and provisions for themselves for three days—which must last five days. Infantry officers and soldiers must carry on their persons or on led-horses or mules, the same; to which end will be allowed to each company when practicable—one led-horse or pack-mule. Artillery can carry the same on their caissons, so that all troops must be in readiness for motion without wagons for a five-days' operation."

The men carried sixty rounds of ammunition, forty in the cartridge boxes and twenty in their pockets. It was observed that in the second and third days of the march many men abandoned their overcoats and blankets if the weather was warm.

General Ingalls in his report said: "Our troops are undoubtedly loaded down on marches too heavily even for the road, not to speak of battle. I have witnessed great loss of knapsacks and articles of clothing on the routes taken by our troops at the commencement of the campaigns. In my report of the Chancellorsville campaign I showed you that the loss of knapsacks of those actually engaged was at least twenty-five per cent. I am in favor of putting the lightest possible weight on the soldier, consistent with his wants and the character of the service. I do not think the knapsack should be dispensed with altogether, for it should, ordinarily, form a part of the equipment, but on short campaigns, and on the eve of battle and when near the supply trains, a blanket rolled up and swung over the shoulder, and looped up under the arm, is sufficient without knapsack or overcoat. The soldier can carry three days' cooked food in his haversack. If necessary he can carry two or three days' bread and some underclothes in his blanket. Our men are generally overloaded, fed and clad, which detracts from their marching capacity, and induces straggling."*

As the war progressed the tendency to abandon the knapsacks was very marked until finally they were seldom used in the field, and the suggestions outlined above were adopted with the addition of half of a shelter-tent and a rubber blanket (poncho) to the blanket roll.

General Sherman says: "Each soldier should if not actually 'sick or wounded,' carry his musket and equipments containing from forty to sixty rounds of ammunition, his shelter-tent, a blanket or overcoat, and an extra pair of pants, socks and drawers, in the form of a scarf, worn from the left shoulder to the right side in lieu of knapsack, and in his haversack he should carry some bread, cooked meat, salt, and coffee. I do not believe a soldier should be loaded down too much, but, including his clothing, arms, and equipment, he can carry about fifty pounds without impairing his health or activity."

The coffee and sugar components of the ration were usually mixed together by the men when stowing them in their haver-

* Report dated August 28, 1864.

sacks; this prevented them from constantly "nibbling" while on the march and therefore tended to husband the supplies carried.

The supplies that the men carried with them were replenished at the earliest opportunity from those carried in the trains.

Depots.—Depots are classed in three categories: 1st, the base depots; 2d, advance depots; 3d, temporary depots. The base depot, from its name, is located at the base of supply and must be remote from the theatre of operations. The advance depots are those formed during offensive movements when an army proceeds so far from its base that it would waste time by drawing supplies directly from the base. These depots are supplied with stores obtained by consignments from that at the base; supplemented, when possible, by others procured in the vicinity. They are located in such places where the supplies can be brought to them and carried from them with the greatest ease, rapidity and safety, and where they can be most easily secured from danger of hostile attack.

A secondary base of supply is an advance depot of sufficiently large dimensions to make an army independent of the base when the line of communication is very long. As the difficulties of supply increase with the length of the line of communication, when the distance of an army from its base is very great the formation of a secondary base becomes indispensable to facilitate the transportation of supplies. A secondary base must contain a surplus of such stores and army needs, so as to provide against any temporary interruption on the lines of communication, and a very complete organization is essential, as a variety of demands will be made upon it, all of the utmost urgency and admitting of no delay. Temporary depots are small ones, sufficient to provide merely for the daily wants of the troops. Such depots are usually temporary in character, existing for a few days, and sometimes only for one day.

In Sherman's campaign against Atlanta the base depot was located at Louisville. Nashville, Chattanooga, Knoxville, and Johnsonville, were the advance depots. Allatoona, and Big Shanty in Georgia, were the temporary depots containing supplies intended solely for the immediate use of the army. The depots of Nashville and Chattanooga were expanded so as to form a secondary base of supply, and a thirty days' supply of rations for 100,000 men and clothing for six months were stored at Chattanooga. During Sherman's march through the Carolinas depots

were established at the following places: Sister's Ferry, Fayetteville, Morehead City, Newberne, Goldsboro' and Raleigh.

The base depots for the Army of the Potomac were at Alexandria, Baltimore, and Annapolis. During the Peninsular campaign depots were located at Fort Monroe, Cheeseman's Landing, and Brick House on the York River, and White House on the Pamunkey; the railroad was rebuilt from White House as far as Savage Station and at the latter place a depot of supplies was established which was destroyed when the army let go its hold on the Pamunkey and established itself on the James River, when the depot was located at Harrison's Landing. These depots were changed in accordance with the movements of the troops, the fleet with the transports moving around to the different places so as to be in easy reaching distance of the trains. In the Maryland campaign the Army of the Potomac was supplied direct from the base at Alexandria, by means of its wagon trains, until after the recapture of Frederick. The destruction of the railroad bridge over the Monocacy necessitated the formation of a temporary depot on the left bank of the river while the bridge was being rebuilt and supplies were shipped there over the Baltimore and Ohio railroad, from the base depot, at Baltimore. After the battle of South Mountain a depot was established at Hagerstown, and the supplies forwarded there over the Cumberland Valley railroad. After the battle of Antietam the supplies were forwarded from Alexandria, New York, Philadelphia, and Baltimore, and an advance depot was formed at Harper's Ferry and later at Berlin. When the army crossed the Potomac a depot was established at Salem on the Manassas Gap railroad, and supplies were forwarded there from Alexandria.

When the army entered upon the Fredericksburg campaign depots were established at Acquia and Belle Plain; the former assumed the proportions of a secondary base (although it was never so designated), and large wharves were constructed and storehouses erected there to accommodate all the supply departments. The army was supplied from these depots by the Acquia and Fredericksburg railroad, along the line of which temporary depots were located at convenient points for the delivery of the supplies, the principal one being at Falmouth.

After the battle of Chancellorsville the depot at Falmouth was broken up and the army moved by Dumfries, Fairfax, Leesburg, Edwards' Ferry and Poolesville to Frederick and entered upon

the Gettysburg campaign. For its supply during that epoch depots were established at Westminster and Frederick; the supplies were forwarded to the former from Baltimore over the "branch road" from that place, and to the latter over the Baltimore and Ohio.

When the rebel army crossed into Virginia after the battle of Gettysburg the Army of the Potomac concentrated in the vicinity of Harper's Ferry and Berlin and replenished its supplies from the depots located at those places and also from the one at Sandy Hook; the lines of supply were the Chesapeake and Ohio canal and the Baltimore and Ohio railroad. Having crossed the Potomac the army was supplied from depots at Gainesville and White House on the Manassas Gap railroad, and also from the one at Warrenton, on the branch road of that name. The army then took up a line near the Rappahannock, across the Orange and Alexandria railroad, and depots were established at Warrenton Junction, Warrenton, and Bealton.

September 15, 1863, the army advanced to Culpeper and vicinity and remained there until October 11th, when the movements of the rebel army necessitated a rapid march to Centreville. The Orange and Alexandria road was destroyed by the rebels from Broad Run to the Rappahannock during this retrograde movement, and while it was being rebuilt the depots were at Manassas and Gainesville. When the concentration at Centreville was effected, Fairfax Station became the advance depot. The enemy retreated to the Rappahannock and was pursued by the Army of the Potomac, which forced a passage of that river and drove the enemy to the Rapidan, and then Brandy Station became the advance depot. While at Mine Run the army was supplied by its trains, of wagons and pack-mules, from that depot.

December 1st, 1863, the army fell back and occupied its former positions in the vicinity of Culpeper and remained there until May 4, 1864, when the grand campaign from the Rapidan to the James was commenced. On that day the depots at Brandy Station and at other points on the railroad, as far as the Rappahannock, were broken up and all surplus stores sent to Alexandria. Communications were opened with Acquia and Belle Plain, the river was cleared of obstructions by the navy, and the railroad from Acquia to Fredericksburg was repaired. During the flank movement to Spottsylvania the trains were parked at Fredericksburg, and the depots remained unchanged. On May

21st the depots at Acquia, Belle Plain, and Fredericksburg, were abandoned, and one was established at Port Royal. The army crossed the Pamunkey on the 28th and took up a position at Cold Harbor, and on the 31st a depot was established at White House. June 12th the advance across the Chickahominy and the James was commenced, and, on the 16th, upon reaching the latter river, a depot was established at City Point. During the siege of Petersburg in the final operations against Richmond, City Point was made a secondary base of supplies for the armies of the Potomac and the James; and separate wharves were provided there for unloading the various kinds of supplies; a large repair depot for the wagon transportation; twenty large ovens constructed by the Subsistence Department, capable of producing one hundred and ten thousand rations of bread per diem, for the supply of the armies of the Potomac and James; and the Medical department had large permanent hospitals located there which received the sick and wounded from the field hospitals and from which the convalescents were conveyed by water, in steamers specially fitted for such service, to the great hospitals at Washington, Philadelphia, Baltimore, etc.* Expense depots were located at Cedar Level, Bermuda Hundred, and at Jones' Hundred, Point of Rocks, Deep Bottom, Broadway Landing, and Varina Landing.

In 1862, during Grant's campaign against Vicksburg, Holly Springs was his secondary base of supply. The capture of that place by Van Dorn and the destruction of supplies there, valued at over a million dollars, together with the demolition of the railroad between Jackson, Tenn., and Columbus, Ky., by Forrest, caused the abandonment of the campaign.

After the capture of New Orleans that city became the sec-

* "All of these improvements were rendered absolutely necessary in order to create a depot of sufficient magnitude and facilities for the supply of the armies lately operating against Richmond. Storehouses had to be erected to protect the daily supplies, and to hold in depot 20 days forage, and at least 30 of subsistence, besides large quantities of clothing, ordnance, and hospital stores. Wharves had to be put up for the different departments. There were, generally, at the depot, in harbor, from 150 to 180 vessels of all kinds daily, and the amount of business transacted was immense. The daily supply of forage, for instance, was over 600 tons of grain and hay. I make these remarks simply to show you why such extensive preparations were necessary. The depot was and is the most perfect and commodious of any ever established anywhere for the supply of armies, and the Government has gained by it more than it cost." Report of General Rufus Ingalls, dated June 24, 1865.

ondary base of supplies for all operations throughout the southwestern portion of the theatre of war.

In Banks' Red River campaign the condition of the river and the inability of the transports to pass the falls, made it necessary to establish an advance depot at Alexandria; which was a departure from the plan of the campaign as no depot at any point on the Red River was contemplated.

Allowance of Transportation.—The number of wagons required by an army in the field will vary according to the character of the theatre of operations, the resources of the same in food supplies, and the railroad and water transportation, the length of haul from the depot to the army in the field and also with the capacity of the wagons.* In other words, as the distance of an army from its base of supply increases a greater number of wagons is required. The Comte de Paris has calculated that an army of 100,000 men to move ten days from its base would require 10,975 wagons drawn by 65,850 animals. In order to prevent tying an army to its base advance depots were formerly established at places separated by about four days' march; the introduction of steam made an army still more independent of its base; and during the Civil War as the character of the country favored it, an innovation was effected by moving these advance depots to different points so as to be within easy distances from the army. This was especially the case with the Army of the Potomac as the fleet of transports could move around by the rivers and Chesapeake Bay so as to keep near the army in all its movements.

At the beginning of the war the amount of transportation considered essential and allowed the armies was so excessive that General Halleck said: "If it be true that the success of an army depends upon its 'arms and legs,' ours has shown itself deficient in the latter of these essential requisites. This defect has been attributed to our enormous baggage and supply trains. * * * There is no doubt that the baggage trains of our armies have been excessively large. Every possible effort has been made * * * to reduce them; but it is no easy task. Once accustomed to a certain amount of transportation, an army is unwilling to do without the luxuries which it supplies in the field."† He

* "One good six-mule team, in the best season of the year, is sufficient to haul this load (i. e., 3730 lbs.) and its own forage of 270 lbs., or a total of 4000 lbs." (Hobart,—"Army Wagon Transportation.")

† General Halleck's Report, dated November 25, 1862

also stated that the increase of the army ration, "which was previously larger than in any other country," necessitated a considerable amount of transportation.

The allowance of transportation was reduced from time to time by orders* from Army Headquarters until it was finally reduced to the following for the armies operating against Richmond:†

The Lieutenant-General and army commanders were allowed such transportation as was deemed necessary; army corps headquarters, four wagons or eight pack-mules; division headquarters, three wagons or five pack-mules; brigade headquarters, two wagons or five pack-mules. The foregoing wagons and pack animals included the transportation for all personal baggage, mess chests, cooking utensils, desks, papers, etc.

Each regiment of infantry, cavalry, or battalion of heavy artillery, two wagons; for each battery of artillery, one wagon. The number of wagons allowed for artillery ammunition depended upon the number and character of the guns; for the reserve artillery there was to be 20 rounds of ammunition for each gun; for small arm ammunition there were allowed three wagons for every one thousand men of cavalry, infantry and heavy artillery, present for duty; for fuses, powder, and primers, for the reserve ammunition train, two wagons. For the general supply trains seven wagons to each one thousand men of cavalry, infantry and heavy artillery, for forage, subsistence, etc., which should carry eight days' supply; to each cavalry division exclusively for forage, fifty wagons; to each battery for its subsistence, forage, etc., four wagons; each horse battery for the same purpose, four wagons; to every 25 wagons of artillery ammunition train, five wagons additional for the forage of the animals and the subsistence of the men. Ammunition trains were loaded exclusively with ammunition. To each brigade, for hospital supplies, three wagons; to each corps headquarters for forage and subsistence, three wagons; each division two; each brigade one wagon, for similar purposes; and to each brigade one wagon for commissary

* G. O., No. 130, A. G. O., September 14, 1862.

G. O., No. 160, A. G. O., October 18, 1862.

G. O., No. 274, A. G. O., August 7, 1863.

† Special Orders No. 44, Headquarters Armies U. S., City Point, Va., June 28, 1864. This order, published the third year of the war, may very properly be considered as the standard upon which, in the future, all estimates for allowance of transportation for armies in the field will be based.

stores for sales to officers.* The unit of organization for the supply trains of subsistence, ordnance and forage was by division, and the division quartermasters were responsible for them. Brigade and regimental quartermasters were responsible for the brigade and regimental baggage trains respectively. It was found by experience that the advantage of keeping up regularly organized pack trains was not commensurate with the expense; and to provide for emergencies when they could very advantageously be used, two hundred pack saddles were carried in the wagon trains of each corps; and in cases where it was necessary to pack baggage, provisions and ammunition, for short distances over rough roads and broken country, the *pack* trains were made up temporarily by taking mules from the wagons, not exceeding two mules from any one wagon.

Size of Trains.—The Army of the Potomac in its first operations upon the Peninsula was supplied by means of a flotilla sent down the Potomac river and Chesapeake Bay, which established advance depots at the points indicated above, and as such places were within easy distance of the troops large supply trains were unnecessary. General Ingalls reports on the first of July, 1862, as the result of an inspection then made, that the Army of the Potomac had in its possession the following means of transport; 3100 wagons; 350 ambulances; 17,000 horses and 8000 mules; the army numbered 80,000, or forty wagons in all to every thousand men. After the battle of Antietam the size of the train with the army was: 3911 wagons; 907 ambulances; 12,483 mules and 8693 horses, not including those with the artillery and cavalry; the army numbered 110,000 men; or, forty-nine wagons for every thousand men.

In the Gettysburg campaign the trains numbered over four thousand heavy wagons. After the retreat of the rebel army from Gettysburg the Army of the Potomac was ordered concentrated at Middletown on the evening of July 7th, and no trains but ammunition wagons, medical wagons and ambulances were permitted to accompany the troops. The supply and baggage wagons were ordered to be parked in the Middletown valley on the roads taken by their respective corps. After crossing the Rappahannock, in Grant's advance upon Richmond, the troops that composed the armies on that river numbered about 125,000 men.

* Paragraph III. of General Orders No. 7, 1864, Military Division of Mississippi, restricted the officers to the same food as the men were provided with.

There were 4300 wagons; 835 ambulances; 29,945 cavalry, ambulance, and team horses; 4046 private horses and 22,528 mules; 34 wagons to every thousand men. In the Appomattox campaign the Army of the Potomac numbered 107,777 men; there were 25,796 horses and mules; 2448 wagons; twenty-two wagons and 239 draft animals per thousand men.

On July 1st, 1864, General Sherman's army, which was composed of the armies of the Ohio, Cumberland and Tennessee, numbered about 100,000 men, and had about 28,300 horses, 32,600 mules, 5180 wagons, and 860 ambulances, or 60 wagons to every one thousand men. On leaving Atlanta November 15, 1864, General Sherman's army consisted of 63,680 men, 14,768 horses, 19,410 mules, 2520 wagons, and 440 ambulances; forty wagons to every one thousand men.

From the foregoing it is seen that the size of the trains decreased in each successive campaign, and at times the armies were sent forward without any.

Composition and Movement of the Trains.—The trains moved as follows: Wagons containing small-arm ammunition coming first, and then those containing the ordnance, subsistence, and forage, following after in the order named, and the sutlers' wagons bringing up the rear of the column.

"In a forward movement our trains are never in the way of the troops; on the contrary, each corps has its train which follows it on the march, and which forms its indispensable, movable magazine of supplies. Wagon trains should never be permitted to approach within the range of battle fields. They should be parked in safe and convenient places out of risk, and well guarded. Troops should go forward to battle lightly loaded, and without wagons except for extra ammunition. If they are successful, the trains can be brought up very quickly; if defeated, they will find an unobstructed road, and will get back to their wagons soon enough." *

General Ingalls says of the Gettysburg campaign that the wagon train and all impedimenta were assembled at Westminster, a distance of about twenty-five miles in the rear of the army, no baggage was allowed in the front, a portion only of the ammunition wagons and ambulances were brought up to the immediate rear of the lines. By this arrangement, which was always made in the Army of the Potomac, on the eve of battle and marches

* General Ingall's Report, dated September 28, 1863.

in the presence of the enemy, experienced officers were enabled to supply their demands without risking the loss of trains or obstructing roads over which the columns marched. Empty wagons were sent to the rear and loaded ones or pack trains brought up during the night or at such times and places as did not interfere with the movements of the troops. He also adds that in this campaign the trains, large as they were, never delayed the march of a column, and excepting the small-arm ammunition trains were never seen by the troops. The main trains were conducted on roads to the rear of the army without the loss of a wagon.

In Sherman's march to the sea, in starting out from Atlanta, the empty wagons to be loaded with forage and other supplies taken from the country were at the head of the trains so that, when reaching farm-houses and other points where supplies were obtained, the wagons turned out of the road and were loaded by the time the rear of the general supply trains came up to them, and then fell into their proper places.

In the Red River expedition the column was preceded by the cavalry which was followed by its wagon trains and then the infantry. On approaching Sabine Cross-roads, April 8, 1864, it was confronted by a Confederate force commanded by General Richard Taylor, and after a short conflict the cavalry was driven back, and as the wagons blocked the roads the infantry were unable to be brought to the front and in consequence the Federals lost their trains.

General Grant says* there never was a better organized corps than that of the quartermasters corps of the Army of the Potomac in 1864. The wagon train would have extended from the Rapidan to Richmond if marched in single file upon one road. General Ingalls had each wagon marked with the corps badge, division color and the number of the brigade, so that the particular brigade to which each wagon belonged could readily be told. The wagons were also marked to indicate the contents, if ammunition whether for artillery or infantry, if forage whether grain or hay, if rations whether bread, pork, beans, rice, sugar, coffee, or whatever other components of the ration. As soon as a wagon was emptied it was at once dispatched to the base to obtain a load of precisely the same article as that which had been taken from it.

Ambulances—Hospital Supplies.—An Act of Congress approved

* Memoirs, Volume II., page 198.

March 11, 1864, provided that there should be furnished to each army corps two horse ambulances on the following basis: three to each regiment of infantry of five hundred men or more; two to each regiment of infantry of two hundred men and less than five hundred men; one to each regiment of infantry of less than two hundred men; two to each regiment of cavalry of five hundred or more; one to each regiment of cavalry of less than five hundred men; and one for each battery of artillery; two ambulances to headquarters of each army corps; and to each division train of ambulances, two army wagons. The Medical Director of the army corps was given charge of the direction and supervision of all ambulances, medicine and other wagons, horses, mules, harness, etc., and of all officers and men detailed to assist the management thereof in the corps in which he was serving. Officers and men were detailed from each corps for service in its own ambulance corps. The field hospital of each corps was located about three miles in rear of the line of battle, and there were assembled the medicine wagons, four army wagons containing a thousand rations, clothing and other supplies. The field hospital was composed of the same number of sections as there were divisions in the corps, each section being under charge of the medical officer of the division to which it appertained. Necessary assistants were detailed in these hospitals and the remainder of the surgeons were on the battle-field where they took advantage of any shelter to form small temporary hospitals, in the rear of which ambulances were stationed. The litter bearers brought the wounded to these temporary hospitals from which they were transferred to the field hospital, and eventually to the permanent hospitals located at the depot of supplies, and thence transferred to the general hospitals in different parts of the country.

"We began the war with methods borrowed from Europe. We ended with methods that were developed by the cries of our wounded for relief. We realized that to enable a medical department to care properly for the wounded of an army it must have full control of all the men and material needful to this end."*

There were various charitable organizations instituted during the war for the purpose of relieving the sick and assisting the wounded, among these may be mentioned the Sanitary Commission, the officers of which received donations of supplies and money

*Major Smart.—"Medical Department of the Army."

from all the loyal States. "Wherever our armies fought, wherever there were any sufferings to assuage or sick to relieve, upon the field of battle or in the hospital, amongst the camps and in the garrisons, for the men assembled under the flag and for those whom sickness or wounds sent singly to their homes, the Sanitary Commission was always there, as indefatigable in its devotion as it was inexhaustive in its assistance."*

General Sherman says: "For the more delicate and costly articles of food for the sick we relied mostly on the agents of the Sanitary Commission. I do not wish to doubt the value of these organizations, which gained so much applause during our Civil War, for no one can question the motives of these charitable and generous people; but to be honest, I must record an opinion that the Sanitary Commission should limit its operations to the hospitals at the rear, and should never appear at the front."†

Sutlers.—The laws of Congress authorized the appointment of a sutler for each regiment in the army. But one sutler was allowed to a regiment and the various stores which they were permitted to sell were also defined by law, with a restriction limiting the lien to one-sixth of the monthly pay of the officers and men. In General Halleck's report dated November 15, 1863, in speaking of the reduction of the size of the army trains, he says: "In this connection I would respectfully call attention to the present system of army sutlers. There is no article legitimately supplied by sutlers to officers and soldiers which could not be furnished at a much less price by the quartermaster and Commissary Departments. Sutlers and their employes are now only partially subject to military authority and discipline, and it is not difficult for those who are so disposed to act the part of spies, informers, smugglers, and contraband traitors. The entire abolition of the system would rid the army of the incumbrance of sutler wagons on the march, and the nuisance of sutler stalls and booths in camp."‡

Beef Cattle Herds.—The beef on the hoof accompanying the armies was under the entire control of the commissary officers. The herds of beef cattle were driven by special drivers who were directly under the orders of the chief commissary of the army, or

* De Trobriand.—"Army of the Potomac."

† Sherman's Memoirs, Volume II., page 392.

‡ See also Par. II. G. O., No. 130, A. G. O., 1862, which states that the trains were increased by carrying sutlers goods in them under guise of being Government supplies, and prescribed severe penalties for any one permitting that abuse.

of an army corps if operating detached. The position of the herd, its places of holding, and the rate of march were all controlled by the chief commissary, who received orders on such matters only from the general upon whose staff he was serving. The movements of the herd were so arranged that such number of cattle as were required to furnish the meat ration equivalent to the number of days ration of hard bread, coffee, sugar, and salt carried in the men's haversacks, marched as a unit of brigade organization; the number necessary to constitute the meat ration corresponding with the number of days rations in the soldiers knapsacks, were marched as a division unit. The main or corps herd comprised sufficient number of cattle to furnish rations corresponding to the number carried in the trains. In addition to these there was a general herd provided as a reserve upon which drafts could be made when necessary to replenish the corps herds.*

The butchers connected with the brigade organization slaughtered the cattle at night and then the meat was cooked, and, if upon the march it was issued to the men either late that night or early the next morning so that it could be placed in the haversacks. It was found necessary during the war when the army was encamped for any length of time in the same place to frequently change the location of the herd in order to obtain better pasturage and water, and also to avoid any unsanitary conditions which are likely to arise from the continued holding of a large number of animals in the same locality. No epidemic or disease was, during the last war, directly traceable in any way to the large herds of cattle which were then so generally used. Although in wars on the continent of Europe, as in 1813 and later in 1870-71, great epidemics were traced directly to the large herds of cattle then brought together, some of which were found to be diseased.

The difficulty of obtaining proper pasturage, the slow rate of movement which the herd is capable of, and the fact that one or more roads in rear of the army must be given up to the use of the herd, are (now that the method of shipping dressed meats by means of the cold storage system is so much in vogue), very potent objections to the practice of furnishing the beef supply of an army by means of a cattle herd. But it must be remembered that if this method of supply is to be abandoned a large increase will be required in the transportation furnished the various armies.

* Wilson.—“Feeding a Great Army.”

UTILIZING THE LOCAL RESOURCES.

The right of armies to take from the country all that they require for their sustenance is indisputable; though we usually understand that the expression "living upon the country" has direct application to the enemy's country. Military necessity, as understood by all civilized nations, permits in an enemy's country the enforcement of all those measures which are indispensable for securing the end of the war, and which are lawful according to the modern law and usages of war, and also permits an army to make use of the resources of its own country when face to face with the enemy, because of the absolute necessities of the case and of the paramount duty to defend the country against invasion.

There are four methods of utilizing the resources of the country: 1. By billeting or quartering the troops upon the inhabitants, a right maintained by General Orders No. 100, when in an enemy's country. 2. By contributions levied upon the country. 3. By making requisition for such supplies as are required to satisfy the wants of an army; and, 4. By foraging upon the country, or the collection of supplies found therein by the troops themselves.

Billeting.—Supplies of food are, as a rule, to be found for several days in every town or village, and every householder usually has a sufficient quantity of the same to provide his family for a few days, consequently, at least the same number of men as there are numbers in the household can obtain subsistence there a day or two. When troops are billeted upon the inhabitants the number assigned to each household is dependent upon the number composing the family of the same. An exception should always be made in favor of the poorer classes, who, at the best of times, are barely able to provide for their own families. The following exceptions are usually made: 1st. Any householder who has entertained a wounded man in his house is "exempted from the quartering of troops, as well as from a part of the contributions of war which may be imposed."* 2d. Charitable institutions, hospitals, asylums for aged and infirm; unprotected women, and educational institutions for young girls, should not have troops billeted upon them. The advantage to be derived by this system of subsistence is that the men at the

* Article V, Geneva Convention of 1864, acceded to by U. S. March 1st, 1882.

end of a day's march find, as a rule, their meal ready cooked and prepared, or at any rate, will have to trouble themselves very little with cooking and preparing it. The great disadvantages are that it causes very great dispersion and separation of the different units composing the army, and, except in very thickly settled countries, obliges a command to spread out over too large a portion of the country in order to obtain subsistence. The men, furthermore, live in the kitchen and are very apt to obtain either by force or in other ways more supplies than they are entitled to, and, furthermore, very many indignities are liable to be offered to the female portion of the inhabitants of the country, as their natural protectors are, in many instances, enrolled in the ranks of the enemy's army. Moreover this method may lead to oppression on the part of the troops, if they are not treated as liberally as they consider they should be, and it will provoke frequent disputes if more is demanded from the inhabitants than they can fairly be expected to furnish; and the dispersion of the troops prevents the officers enforcing strict compliance with orders, and, therefore, is subversive of discipline. This method of subsisting the troops was not resorted to upon any occasion during the Civil War, although the Government, in General Orders No. 100, Section 37, reserved the right to do so in the enemy's country.

Contributions.—Contributions in money were formerly imposed upon cities and districts instead of subjecting them to pillage. They are now recognized as one of the justifiable means of causing the inhabitants of an enemy's country more fully to feel the rigors of war and thus are means of bringing the same to a speedy termination. The Army Regulations of 1863 provided that when the wants of the army absolutely required it, and under special instructions from the War Department, that the General of the Army was authorized to levy contributions in money on the enemy's country occupied by the troops. But no other commander could levy such contribution without written authority from the General Commanding in chief. "Contributions are principally possible in large towns and cities, and as a rule, are the only demands that can be made on a manufacturing population."*

Contributions have the following advantages over requisitions in kind: 1. The collection is less difficult. 2. While the burden

*Furse.—"Lines of Communication in War."

of the requisition bears almost entirely upon the producers and manufacturers, contributions bear upon each one in proportion to his financial resources and are consequently, less of a hardship. 3. They can be made over a wide extent of territory, as money is easily transported. They should not be imposed in excess of military necessity, and the amount should be fixed in accordance with the wealth of the country and so as not to affect social conditions, but it is perfectly permissible to make contributions excessive, provided the purpose is by such means to effect a more speedy termination of the war. Private property and the person of the peaceable inhabitants who are citizens of the occupied territory are respected, as war is waged against a State and not against individuals, and consequently contributions are as a rule imposed on municipalities. The sum demanded should be collected through the local civil authorities, if any remain in the country, and should by them be handed over to the proper officer in the invading army to be by him accounted for in accordance with instructions.

The contributions imposed during the Civil War were not intended to secure funds to provide the necessary supplies for the armies but were usually resorted to as a species of reprisal as shown by the following order, viz. :

"SPECIAL ORDERS, }
"No. 40. }

"HQRS. LEFT WING, 16TH ARMY CORPS,

"Pulaski, Tenn., December 16, 1863.

"I. In accordance with the orders of Maj. Gen. U. S. Grant, Perry Nicks, of Lewis County, Tenn., having been damaged by guerrillas, citizens, etc., to the amount of \$800, it is hereby ordered that an assessment to that amount be made upon the known rebels of that county, and collected in money, cotton, or stock, and turned over to Mr. Nicks. A full account and report of the transaction under this order will be made to these headquarters. Major Murphy, of Fifth Tennessee Cavalry, is requested to carry out this order.

* * * * *

"By order of Brig. Gen. G. M. Dodge.

"J. W. BARNES,

"Lieutenant and Acting Assistant Adjutant-General.

Requisitions.—Requisitions are demands for necessary supplies and services made on the inhabitants of certain districts or locali-

ties, through their civil authorities, to satisfy the requirements of an army. They are accompanied by force, if necessary to resort to such extreme measures, to exact the fulfilment of the demands.

Requisitions are of comparatively recent date.* In former times the invader possessed the right of booty and pillage, the practice of which was most unfortunate for the army, as it embittered the population and compromised the safety of the troops in an enemy's country, and in the event of any real or imagined injury being done them it gave rise to redress and reprisals; it furthermore caused the interruption of all commercial transactions, and stores were not offered for sale, as private individuals were compelled to submit their supplies to the rapacity of the enemy.

Requisitions may be considered under two aspects; according to whether they are made in an enemy's country or in the national territory. In the latter instance they are only made in case of urgent necessity, and receipts are always given, which are eventually paid. In our own territory we can count on the patriotic feeling of the people and on their obedience to the mandates of the civil authorities. To enforce requisitions, however, when campaigning in a friendly State, is a delicate operation. For, in all appearances, the people are subjected to the same exactions as are enforced on the inhabitants of a hostile country. Even in an enemy's country requisitions should never be imposed in too arbitrary a manner. Before making any exactions an estimate should be formed of all the resources which the inhabitants can be made to surrender without subjecting them to serious want.

Vauchelle remarks: "These demands should be imposed and apportioned with judgment and moderation, taking into consideration the population, the geographical situation, the nature of the products, the richness of the country, and also, when possible proportioning the extent of the demands to the grievances of the

* Requisitions were first employed by Washington and so named by him during the Revolutionary War. "In order to provide for the wants of the Continental troops who were in need of food and clothing, and even shoes, he frequently resorted to requisitions, but 'always exercised great moderation and endeavored to protect private property. He never resorted to such means except in cases of urgent necessity, and then asked in a detailed manner for such articles as were indispensable for his army, employing the form of a request, reserving vigorous measures for the recalcitrant. Furthermore, he gave receipts for the articles received, which were eventually paid.'"

Cf. Georges Ferrand *Réquisitions Militaires*, page 3, and Calvo "*Droit International Théorique et Pratique*," section 2235; also Rouard de Card, "*La Guerre Continentale*," etc., page 170, quoted by Georges Ferrand, page 3, "*Réquisitions Militaires*."

conquerors. To ravage a country you reduce the inhabitants to misery, to despair, flight, etc.; and then you not only deprive yourself of their favorable coöperation, but, on the day of reverse, you will find in these same men implacable and cruel enemies."

Requisitions are further divided into two categories: first, those that are paid for; and, second, those that are not, but are imposed as a species of fines to help reduce the cost of the war.

Jomini says: "A general should know how to turn to advantage all the resources existing in the country which he invades; he should make use of the authorities, when they remain there, to impose uniform and lawful requisitions, which he will cause to be paid for promptly if he has the means; when the authorities do not remain, he should appoint provisional ones, composed of well-known men and invested with extraordinary powers. They will have the supplies requisitioned collected in the safest places and the most favorable for the movements of the army, and in the vicinity of the principal lines of operations."

Such requisitions as were imposed during the late war were ordinarily not paid for at the time. Resort was frequently had, and particularly by the Confederates in their various raids throughout the border States, to requisitions exacting the delivery of certain supplies. These requisitions were made upon the local authorities and were usually of the form given below:

"HEADQRS. 2D ARMY CORPS, A. N. V.

June 27, 1863.

"To the Authorities of Carlisle, Pa.:

"By direction of Lt. Gen'l R. S. Ewell, I require the following articles:

"5000 suits clothing, including boots, shoes and hats.

"5000 bushels grain (corn or oats).

"10,000 pounds sole leather.

"10,000 pounds horse shoe nails.

"Also use of printing office and two printers, to report at once.

"All articles except grain will be delivered at the Court House Square at once.

(Signed) "JOHN A. HERMAN.

"Major and Chf. Qr. Mr.,

"2d Army Corps, A. N. V."

Foraging upon the Country.—Foraging upon a country is to collect the supplies for men and horses either from the enemy or

from friends by impressment. This method differs from requisitions in that the collection is made directly by the troops without the assistance of the local civil authorities.*

Instructions were given to generals operating in hostile territory, to subsist their armies whenever possible upon the country, receipting and accounting for everything taken, so that all loyal persons might afterwards be remunerated for their losses.† The supplies obtained in accordance with the instructions referred to, were gathered by detachments designated from the various corps throughout the army. The laws of the United States and the general laws of war authorized in certain cases the seizure and conversion of private property for the subsistence, transportation and other uses of the army, and provided that all property lawfully taken from the enemy or from the inhabitants of an enemy's country instantly became public property and was to be used and accounted for as such. The Articles of War (Art. 52) prescribed the severest penalty, death or such other punishment as the court directed, for any officer or soldier who should quit his post or colors to plunder and pillage; and the penalty was the same whether the offense was committed in our own or the enemy's territory. A very marked distinction was thus drawn between foraging or the collection of supplies by properly deputed forces, acting under lawful orders, and pillaging or plundering by individuals or squads. All property, public or private, taken from the enemy was to be inventoried and duly accounted for. If the property taken was claimed as private, receipts were to be given such claimants or their agents, and officers were held strictly responsible for all property taken by them or by their authority and it was accounted for the same as any other public property.

When foraging bodies were sent out to collect provisions or other stores, the commanding officer of such party was held responsible for the conduct of his command and required to make a true report of all property taken.

In order to enable the troops to utilize the supply of corn

* "Of course, you cannot question my right to 'forage upon the country.' It is a war right as old as history. The manner of securing it varies with circumstances, and if the civil authorities will supply my requisitions, I will forbid all foraging. But I find no civil authorities who can respond to calls for forage or provisions; therefore must collect directly from the people." General Sherman to Wade Hampton, February 24th, 1865. See also Century Dictionary.

† Order of the President, dated July 22, 1862, published in G. O. No. 109, A. G. O., 1862.

which was sometimes found in great abundance, portable mills for grinding the same were in some instance provided,* and proved quite useful in the Army of the Tennessee. Suitable mills for grinding wheat were not made. The objection to using portable mills is that it is practically impossible to properly bolt the meal or flour with them, and in consequence it is very liable to cause sickness by creating stomach troubles; but such flour or meal can be used to advantage if mixed with other of good quality.

General Johnston said, in speaking of the methods adopted by the Confederates to obtain their supplies in the States in rebellion, that "supplies, also, instead of being honestly raised, were impressed by a band of commissaries and quartermasters, who only paid one-half the market value. As might have been expected, this was enough to prevent them getting anything. These they took by force, and did it with the greatest injustice. You can imagine what disorganization of labor and what discontent this produced."†

During the early part of the war there seemed to be some hesitation among the commanders of the Federal armies about utilizing the resources of the enemy's country in order to obtain the supplies for their armies.‡

In speaking of the collection of supplies by the foraging parties, General Sherman says that each brigade commander had authority to detail a party of foragers of about fifty men with one or two commissioned officers. This party was sent out before daylight, being informed of the route of the day's march, and proceeded five or six miles from the road travelled by the brigade and then visited every plantation and farm within range. Wagons of some sort were obtained which were loaded with the supplies collected and then the party regained the main road and waited until the arrival of the train, when the supplies were turned over to the brigade commissary or quartermaster. General Sherman states: "No doubt, many acts of pillage, robbery, and violence, were committed by these parties of foragers, usually called 'bummers' * * * but these acts were exceptional and incidental.

* "Movable columns in the field should be furnished with hand and horse mills for grinding the grain which they procure in the country." Par. III. G. O. No. 2784, A. G. O., 1863.

† Swinton's—"Campaigns of the Army of the Potomac." Page 572.

‡ General Halleck's Report, November 15, 1863; and Grant's Memoirs, Volume I., page 369.

* * * No army could have carried along sufficient food and forage for a march of three hundred miles; so that foraging in some shape was necessary. The country was sparsely settled, with no magistrates or civil authorities who could respond to requisitions, as is done in all the wars of Europe; so that this system of foraging was simply indispensable to our success."

The supply of forage for the animals in an army is at all times a most difficult task, as the bulk to be supplied is so enormous. There was much suffering and great loss among the animals in the several armies when they went into winter quarters owing to the difficulty of obtaining forage; this was particularly the case in the Army of the Cumberland when in the vicinity of Chattanooga, in 1863. When upon a campaign it is usually possible to collect all of the long forage and most of the grain the animals require; this was strikingly shown in Sherman's march to the sea and is concisely expressed in his letter to the Quartermaster General dated December 25, 1864.* A large body of cavalry, and especially an independent cavalry command, may often be unable to provide forage for its animals even in a rich country, for if in pursuit of the enemy it cannot take time to search for the grain during the march, otherwise it is likely that but little damage could be inflicted upon the enemy. Whenever cavalry is to rest and recuperate from the strain of a hard campaign, it cannot be expected that the command will be able to provide forage for its animals; for 10,000 or 15,000 horses consume the surplus of a very rich district in an incredibly short time, and if the horses and men are sent out to scour the country for forage neither will obtain the rest needed; and therefore depots of grain and hay must be provided in such cases. General J. H. Wilson in his report † dated February 6, 1865, of the pursuit of Hood's army and his march from Athens, Ga., to Gravelly Springs, Ala., sets forth the difficulty of providing forage for the horses under such circumstances.

The great objection to the method of supplying an army by means of foraging upon the country is that it is almost impossible to prevent the men from scattering over a wide extent of the country in search of food and plunder, and as a consequence the number of stragglers and skulkers largely increases and the dis-

* Rebellion Records, Volume XLV., page 512.

† Rebellion Records, Volume XLV., page 513.

cipline of the army is apt to be very lax.* The armies in the western part of the theatre of operations resorted to foraging quite generally during the latter portion of the war, and this system was also employed by the cavalry when on their raids. The Confederate army at all times adopted this system. The Confederate reports are replete with evidence of the enormous straggling in their armies, and, in speaking of his campaign in Maryland, Lee says: "The arduous service in which our troops had been engaged, their great privations of rest and food, and the long marches without shoes over mountain roads, had greatly reduced our ranks. * * * These causes had compelled thousands of brave men to absent themselves and many more had done so from unworthy motives."† And General D. H. Hill also says: "Thousands of thieving poltroons had kept away from sheer cowardice. The straggler is generally a thief, and always a coward, lost to all sense of shame; he can only be kept in ranks by a strict and sanguinary discipline."‡ Swinton says, page 67, that during the Maryland campaign Lee lost over twenty-five thousand from his effective strength by straggling. When dealing with this evil in his army General Sherman ordered§ "The only proper fate of such miscreants is that they be shot as common enemies of their profession and country, and all officers and privates sent to arrest them will shoot them without mercy on the slightest impudence or resistance."

An Act of Congress approved July 2, 1864, for the purpose of regulating commercial intercourse between loyal and insurrectionary States, and to provide for the collection of private and abandoned property, provided that all moneys arising from the leasing of abandoned lands, houses and tenements, or from sales of captured and abandoned property, should be paid into the Treasury of the United States. In conformity with the above laws of Congress, General Sherman issued instructions prohibiting trade in his army in the field or with moving columns of troops, save that necessary to supply the wants of the troops themselves. This was also probably done as a precautionary

* "Of all things, the most important is, that the men, during marches and in camp, keep their places and do not scatter about as stragglers or foragers, to be picked up by a hostile people in detail." Special Field Orders No. 119, Headquarters Military Division of Mississippi, November 8, 1864.

† Confederate Reports of Maryland Campaign, Vol. I., page 35.

‡ Confederate Reports of Maryland Campaign, Vol. II., page 119.

§ G. O. No. 18, Headquarters Military Division of Mississippi, June 21, 1864.

measure, as spies, on a pretext of being on mercantile errands, have often gained admission within the lines of an army and thus acquired very valuable information. General Sherman also ordered that all such cotton as was found should, when transportation to the rear was practicable, be consigned to some quartermaster at the base to be by him delivered to the agent of the Treasury Department and, moreover, was to be treated as the captured property of an enemy and invoiced accordingly, and no claim of private interest in it was to be entertained by the military authorities.

The exportation from any of the States in rebellion, although fully occupied by Federal forces, of such supplies as were necessary for armies, was frequently prohibited in General Orders. As, for instance, by General Sherman in General Orders No. 20, dated July 13, 1864, prohibiting the exportation of grain and hay raised in the State of Tennessee, and providing that the Quartermaster's Department should purchase the same required for consumption by the army.

There were immense amounts of abandoned and captured property disposed of by the Government during the war, and on February 19, 1867, the Secretary of the Treasury reported that the net amount received from the sale of the same and covered into the Treasury was over twenty five millions of dollars.*

In order to provide for the supply of an army, in the portion of an enemy's country occupied by it, the commanding general exercises direct military control over the same or administers the affairs of the country with the assistance of the local authorities, if they remain, or if not, with those whom he has appointed in their stead. It is perfectly lawful, according to the rules of war, for him to compel the withdrawal from city or town of such portion of the enemy's subjects as he may designate, in order to secure a greater supply of provisions and so forth for the use of his army, and oblige the enemy to deplete his own resources in order to supply inhabitants expelled from the town or city.†

In a communication, dated September 12, 1864, addressed to the mayor and a committee from the City Council of Atlanta, General Sherman said: "We must have peace, not only at Atlanta,

* See House Executive Document No. 97, 39th Congress, 2d Session.

† "War is not carried on by arms alone. It is lawful to starve the hostile belligerent, armed or unarmed, so that it leads to the speedier subjection of the enemy." General Orders No. 100, paragraph 17.

but in all America. To secure this we must stop the war that now desolates our once happy and favored country. * * * You might as well appeal against the thunder-storm as against these terrible hardships of war. They are inevitable, and the only way the people of Atlanta can hope once more to live in peace and quiet at home is to stop the war. * * * Now you must go, and take with you the old and feeble, feed and nurse them, and build for them, in more quiet places, proper habitations." * * *

If, under the conditions of modern warfare, an attempt was made to bind an army, as regards its supplies, to any one particular form or system of providing the same, it would soon be found utterly incapable of making war, or, at any rate, would be at a great disadvantage when opposed by an army supplied by different methods according to circumstances.

Freedom of movement is only possible where a judicious use of the resources of the theatre of war is made; but as large armies cannot be supplied entirely from the same and be held in that state of concentration which insures the best results being obtained, such resources must be supplemented by obtaining a portion of the needed supplies from the base and advance depots; and this is especially necessary as regards the ammunition supply which in general must be obtained from the national territory.

The marked features connected with the supply of the Federal armies during the Civil War were: the use of railroads and navigable rivers, and the facility with which the depots of supply were constantly changed so as to be always in touch with the armies in all their various movements, and always so located as to be within ready access by the wagon trains.

General Baratier says that if it is not always possible to approve the strategy employed by some of the Federal commanders, or to admire their methods of conducting the different campaigns, one is however, "amazed by the vigorous and liberal policy which directed the organization and maintenance of the large armies, which were at all times furnished with great possibilities for action." * In this connection it may be said that the results of a campaign are gauged by the victories and other feats of arms which are exhaustively described by the many participants therein; but it is very seldom adequate credit is accorded the efforts of the administrative officers who indirectly contribute very greatly to the successful issue, although the work of such officers

* Baratier.—*L'Art de ravitailler les grandes Armées.*"

never ceases, nor can flag for one instant. When the army is upon the march these departments are strained to their utmost capacity to supply the wants of the same, and when it goes into winter quarters or halts to recuperate its strength, the same unremitting care and attention must be given by the administrative officers.

As a consequence this great subject of the art of supplying troops in the field is very apt to be neglected in time of profound peace, but, as General Lewal says: "In time of war every moment is precious; to hesitate before acting is a fault; to ask for instructions, to await for orders for supplying the troops would be almost criminal."^{*}

CARBINES FOR THE FOOT ARTILLERY.

BY CAPTAIN H. W. HUBBELL, 1ST U. S. ARTILLERY.

IT will be conceded I think, that small-arms for the foot artillery are in the immediate future to be regarded as a secondary arm, of use for guard and riot duty, repelling storming parties, attacks by infantry upon the trenches or upon batteries exposed on the flanks or rear, and upon such exceptional occasions as may call for the employment of artillery as infantry pure and simple.

That this view is taken by the War Department is inferred from the fact that small-arm target practice at ranges exceeding 300 yards, and extended order drill are not required as part of the instruction of artillery troops.

The infantry rifle is therefore in the hands of such troops, a weapon of unnecessary weight, length, range, and cost. The carbine with a less surface to keep clean would lessen the time required from the artilleryman for the care of his small-arm, and give him more to bestow on the costly and intricate mechanism of the high powered B. L. guns and mortars so soon to be intrusted to his care, and in numbers high in proportion to the strength of the garrisons.

The carbine fitted with a leather sling, like that of the rifle, can be slung across the back of the cannoneer, if necessary, with but slight embarrassment to his movement in the service of a heavy piece or machine gun. The drill for the heavy artillery

^{*} "Tactique des ravitaillements."

of 1863, prescribed that the gun detachments after arriving opposite their pieces should lean their muskets against the parapet or epaulment, but as the experienced traveller learns to keep close to his baggage, so should the soldier keep to his weapons, and avoid the necessity of groping for his small-arm in the darkness, or forgetting it when rushed from one part of the battery to another. The slung carbine would prevent such accidents. The cavalry dismounted, have in the past done most effective work against infantry with their carbines, and so might the foot artillery at a pinch, on such exceptional cases as might call for their services as improvised infantry, which would probably be of short duration.

The musket for the artillery is simply a relic of the days of the Seminole and Mexican wars, when, except for the few companies equipped as field artillery, there was no pretence of assigning the artillery to any other than "straight" infantry duty, the service of the siege train in Scott's army being supplied by officers and soldiers of the Ordnance Department. The bayonet should be fitted to the carbine for moral suasion on a mob, when the circumstances do not as yet seem to require the use of ball cartridges.

For precedent of many years standing, it is to be noted that the Garrison Artillery of European armies are armed with carbine or musketoon with knife or sword bayonet, and the writer observed at the great shore parade of the foreign navies in New York in the spring of 1894, that the Royal Marine Artillery (*not* the Royal Marine Light Infantry) from H. M. S. *Blake* were so armed. Moral deduced from the foregoing remarks, arm the foot artillery with carbines.

THE SQUAD FORMATION: A FEW SUGGESTIONS FOR ITS IMPROVEMENT.

BY P. BORGER.

THE present methods of subdividing the company into squads can hardly be considered perfect. The counting off of fours does not provide sufficient means of defining the squads. Those who have anything to do with dividing the company into sections will bear testimony to this. The corporals as leaders form a sufficient point of demarcation between the squads by reason of their contrasting uniform. But they are not always available. When the squad leaders are privates there is no telling one squad from another except by actual counting of men from the nearest corporal on the right when the company is in the line. The disadvantage of this process for speedy movements is evident.

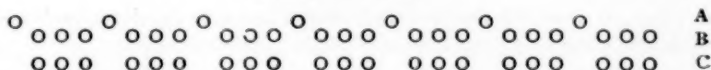
Then, again, the men are apt to become forgetful of their numbers, and thus cause confusion and delay.

The squads in the company in the line must form distinct units, well defined from each other, not merely by an imaginary line dividing the number four of one set from the following number one, but by a unit within the squad homogeneous in appearance and position with the others.

The line of demarcation between the squads must be more substantial; it must be real, visible, so that the men within the squad will be, so to speak, inclosed as by a framework.

One of the simple means of defining the squads would be as shown on the following diagrams;

- A.—Squad leaders.
B.—Front rank.
C.—Rear rank.



to obstruct his access to the rear rank in the inverted formation when the rear rank becomes the front.

This formation of squads would obviate also the necessity of counting off of fours.

The process would be something as follows:

At the command "fall in," the men form a single, double, or triple rank, whatever the formation may be. The corporals place themselves in the vicinity of their respective places facing the front rank.

The right corporal takes his place immediately after the command "fall in." The man originally occupying it and his rear rank man make way to the left. Almost simultaneously with the right corporal the next one takes his place, and so on along the line.

This method is coupled with this disadvantage, though, which is the same as prevails with the present tactics: the corporals by falling in after the men cause a crowding among the latter and consequently a delay.

It may be better if the men who cede their places should form a separate squad on the left of the company.

In those squads where the corporals are absent every fourth man from the right of his squad steps up in the place of the squad leader, and his rear rank man acts as explained before.

This system of squads seems to possess the following features:

1. It obviates the counting off of fours.
2. It isolates and defines the squads sufficiently well to reduce the possibilities of confusion to a minimum.
3. It provides a more conspicuous and a more mobile squad leader than heretofore.
4. It facilitates the inverted formations, and, consequently, augments the mobility of troops, since the rear rank becomes readily the front, without any risk of confusion.

5. The positions of the squad leaders also facilitate the transfer of the file closers to the rear from what has become the front of the company.

Let us consider the inverted formations a little closer and see how the proposed squad system would affect them.

1. The company is in the line, either stationary or marching, in the normal order. It is necessary to face it about. This is done by two means: (1) by squads wheeling about; (2) by the company facing about. The latter is by far the shorter way, and

consequently the best. It is the best because the best tactics are those which bring the soldier where he is wanted by the shortest route, in the shortest period of time, and with the least exertion.

At the command "about face," or "to the rear, march," the squad leader, on executing the movement, takes his place in what now becomes the front rank. If it is necessary for the company to remain in the inverted order during the subsequent evolutions, the captain gives the command "file closers to the rear, march," and the latter pass through the intervals occupied by the squad leaders who clear the passage either by taking a brisk step to the front and right, or by dropping behind their squad and again resuming their places.

11. The company being in column of fours (squads) it is necessary to face it to the rear.

The command of "to the rear, march," or "about, face," will accomplish that end instantly. The squad leaders will take their places in the now front rank of their squads.

Thus, the inverted order will leave the company in identically the same position of readiness and efficiency for subsequent evolutions as it was (has been) previous to the manœuvre. The captain will be able to tell at a glance one squad from another and the men within the squad will readily know their places, without any unnecessary mental exertion on their part.

111. The following manœuvre is invariably attended with confusion on the part of the men with the present tactics.

The company marching by file, the command is given "to the rear, march," then "form fours right or left oblique, march." It requires some calculation to find one's place and the men are invariably averse to such procedure. Now, if they had some indication, some mark to guide them to their places, the manœuvre would be as easy of execution as any.

In the column of files the squad leader is projecting slightly out of the column, 10 inches or less, the same as when the company is in the line. At the command "form squads, right or left oblique, march," the *leading file of each squad halts*, the other files, front and rear, oblique and resume their places in the squad.

This process may not shorten the time of the forming of the squads, but it will certainly prevent confusion and the shoving which habitually accompanies this evolution. As each squad is formed, it closes up in a body to its proper distance from the preceding squad.

Fig. I.



Fig. II.

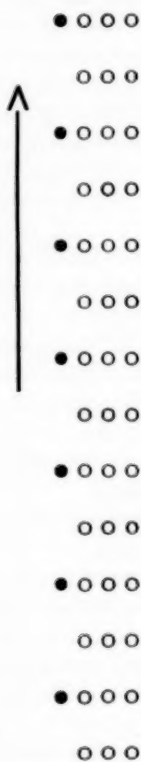


Fig. IV.

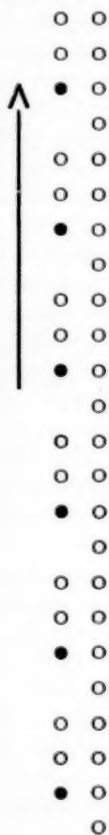


Fig. V.

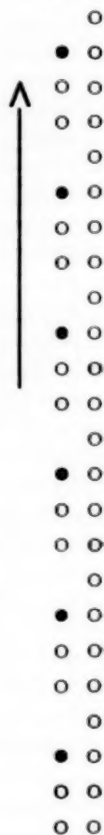
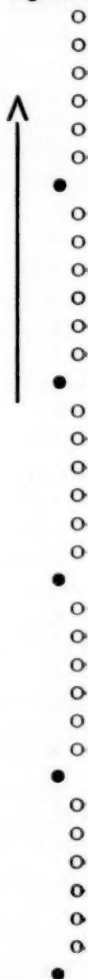


Fig. III.



Here, again, each squad is inclosed between *conspicuously posted leaders* and the men will take their places mechanically, without the least mental exertion.

Fig. I indicates the company in the line.

Fig. II shows the company in the column of squads. Each squad is marked out by a blank space behind the squad leader.

Fig. III. The company in the column of files. Each squad is defined by the position of the squad leader, who is slightly to one side of his squad.

Fig. IV. The company in the evolution of "right by twos." Each squad is also marked out by a blank space behind the squad leader.

Fig. V. At the command "left by two" the squad leader drops back into the blank space behind him, and then the squads are distinguished also by a blank space at the head of each squad.

As to the faults of the system, the following appear the most prominent:

The blank space behind the squad leader leads to the lengthening of the front and the column in the proportion of about one-seventh. Seven squads of eight men each in the column will be increased to eight squads of seven men each, etc. This fault may be overcome whenever occasion requires it by increasing the breadth of the squads by having nine or eleven men in each squad, all depending on the roads. In fact, there is hardly any necessity for fixing the column rigidly to sets of fours. While the habitual road formation of the column may be in sets of fours, yet, when the occasion requires it, or the width of the roads permits it, the column may be in sets of fives or sixes, every fifth or sixth man being the squad leader with the usual blank space behind him.

With the company in motion to pass from the column of fours to the column of fives or sixes, the first squad may be supplemented on its right by one or two files and sixes from the right of the hind squad which, in its turn, will be increased by two or three files from the squad behind it, and so on along the column; each successive squad is increased by $n+1$ files, n being the number of files detached from it to supplement the preceding squad. The supernumerary squad leaders thus produced may take their places among the file closers, or, if privates, fill up the blank spaces if any exist except those behind the squad leaders.

This process actually takes place on the march. Whenever

the ground permits it, the men crowd to the front of the company and march six and ten abreast, or, sometimes three if the road is too narrow.

Why not utilize this peculiarity of the infantry on the march and embody the process in some sort of a road formation more adaptable to the nature of the roads than the present column of fours.

The command may be "form fives" or "form sixes, march," whether the company is in the line or in the column. In the former case the squad leaders, if corporals, will fall in in every fifth or sixth file from the right of their squad. The process would be in every respect the same as in forming the sets of fours.

LIGHT ARTILLERY TARGET PRACTICE.

BY FIRST LIEUT. HENRY C. DAVIS, 3d U. S. ARTILLERY.

SOME ten years ago the military student had offered for his consideration a new treatise on military problems of the day by a German officer of high rank, Prince Kraft by name.

Whatever may have been of merit of his works generally, the reader of his Letters on Artillery must have been struck by his summation of artillery requirements into three rules and the condensation of these three rules into the one word, "Hit."

Following so closely the artillery experiences of a great war, this statement, stripped of all theorizing, necessarily engendered by prolonged peace, must have the true ring.

Our first consideration must be to hit what we shoot at. I do not detract from the importance of being able to occupy a position with all the safety consistent with the required celerity; but I do say that, having done so, if we cannot hit our target, and that quickly, we lose all the advantage gained thereby.

The other arms may resort to a bayonet or sabre charge but we depend solely on fire action.

On the march light artillery, with its ammunition supply, shares, to some extent, with the regular supply trains, the unenviable distinction of being an incubus; but, on the field of battle, if the artillery has learned Prince Kraft's rules, the erstwhile impatience and perhaps indignation of the other arms are tempered to satis-

faction and gratitude while it skilfully prepares the way for an assault or, by its fire, affords shelter for repulsed troops.

If we do not wish to be found wanting on the field of battle, our great peace work must be to learn to hit, to hit quickly and hard. To attain this proficiency, we must work not on generalities alone but on particulars and details. No detail must be considered too small to attract our attention and investigation.

The sister arms have in the past ten years made great strides in proficiency with their weapons, and we will do well to recall the patient and zealous work we did in teaching our red-legged infantry to become marksmen and sharpshooters. Now that the day of artillery is brightening, and even the heavy artillery is turning more to its legitimate work, the recollection of the success that rewarded our efforts, when we were infantry, should incite us to the same sort of painstaking attention to details in our legitimate work.

To learn how to shoot we must shoot, not simply to be shooting, nor by guesswork, or at random, but intelligently; and it is this work that is comprehended in the term "Target Practice," which is here presented under the following heads:

Preliminary work. Ballistic Firing. Target Firing, and Tactical Firing.

Preliminary work, for the artillerist, embraces a thorough mastery of the science of gunnery together with an exhaustive study of the gun to be used and of the ammunition prepared for it. The gunners should be versed in such elementary principles as are deemed necessary for them to know.

In the study of gunnery, we find the results of the latest researches in Captain Ingall's excellent works on Interior and Exterior Ballistics and in his hand-book of problems. In this connection I believe it advisable, if not necessary, for every artillerist to follow the theoretical deductions of the simpler formulæ which are at last presented for practical work. This will engender confidence and will show him at what points and why these formulæ are only approximately correct, and will enable him more understandingly to make corrections for variations in conditions as well as to know what variations are of importance.

As for the gunners tell them simply in what direction these changes affect the range of his shot and about how much. The character and amount of this instruction lies in the discretion of the officer, and depends largely on the receptive capacity of the

men. He should not shoot over the heads of his gunners but rather throw out ideas and observe if an interest is created, if so, he adds something more.

The higher the clouds of ignorance are lifted the better will objects be seen although near the horizon. The further one progresses in a science the more fully will he appreciate primary facts and principles.

Then for both ourselves and gunners, let the mastery of facts and principles and even of theories, progress as far as possible beyond those we are called on to understand for actual practice.

The particular features of gunnery the artillerist must master are those pertaining to the gun and its ammunition; and those pertaining to external conditions usually called atmospheric, both of which will be mentioned hereafter.

To this preliminary work belongs aiming drill, to be engaged in, not by gunners alone, but by all hands, including the officers. In this drill the great desiderata are celerity, accuracy and uniformity.

After the simple principles of aiming are understood then follows the arduous work of putting them into practice, and the training of the eyes of all to see alike.

This uniformity, of little importance in small-arm practice, is of great importance with us, for it will be the rule for one gun to establish the range for the others of its battery or group.

In Battery F, 3d Artillery, the captain has, for aiming, adopted the most excellent rule of seeing the bull's eye or other target resting symmetrically on the upper halves of the cross hairs arranged as a St. Andrew's cross. This particular feature of aiming may be taught in the gun shed with reduced targets, using the triangle method for testing accuracy. But in the subsequent process of eye training it is essential that full sized targets be placed at actual ranges. It is one thing to learn to focus the eye on cross wires and a reduced target at twenty yards, but quite another when the focus is to be made on the cross wires and a target two miles away.

The rapid and accurate use and reading of the auxiliary instruments must be acquired at this stage; officers and non-commissioned officers must read at sight the anemometer, thermometer, barometer and hygrometer and also whatever range-finder may be vouchsafed to us. No range-finder is now issued because none

has been found to fulfill all the requirements of service conditions; this, however, is not actual service, but only preparatory thereto and we should have something, whatever there is on hand, to use while we wait for actual war service and a better instrument. Some kind of angle measuring instrument is a necessity in the next division of our work, viz.:

BALLISTIC FIRING.

The object of this is to familiarize us with our guns and what they will do under normal and other conditions.

We wish to give the gun every chance to establish its character for accuracy, so that in subsequent records we can say how much of the given variations was due to the piece and how much to the personnel. This is very important for, with the accuracy of the gun unknown, we are always prone, in failures, to throw the blame on some body or thing other than ourselves. Let us then use every auxiliary to establish the accuracy of our weapon and then in bad shooting gladly accept the blame for the personnel, which may be improved, rather than attribute it to the piece, over the improvement of which, we have no control.

The target will at first be at short range, say 1000 yards, on ground level for about 200 yards front and rear, for convenience in marking, and also because, if the ground slopes much, the distance from the point of fall to the target will not be the true variation in range. The flatter the trajectory, the greater will this error be. The guns will be on hard ground, smooth and level, that jump may be normal.

Before firing begins, a complete range table must be prepared, not a service range table but one for use with the several auxiliary instruments, and which, like them, belongs exclusively to this division of the work.

This table being complete will give correction factors to cover variations in weight of shot as well as in conditions of atmosphere.* Whistler's Graphic Table of Fire for the 8" C.R. is an excellent model for this.

* About the close of our last target practice I was led to believe that there might be a variation in density of loading and I had hoped before now to investigate this, but have not yet been able to do so.

If there is any variation in this it must be taken into account or corrected. That the theoretical conclusions on this subject are borne out by practice will be remembered by officers who were at Fort Monroe during the summer firing of 1892.

The variation of six ounces in the weight of a 3.2" shot gives the following variations in range :

At 500 yards . . .	10½ yards, and			
" 1000 " . . .	17 " "	1.4 ft. in height.		
" 1500 " . . .	20 " "	2.6 " " "		
" 2000 " . . .	17½ " "	3.7 " " "		
" 2500 " . . .	15½ " "	4.8 " " "		
" 2800 " . . .	14 " "	5.3 " " "		

The lighter shot going further and higher.

When the piece is loaded and before firing, the attention of all must be called to the weight of the shot (density of loading) and the reading of the auxiliary instruments, and how from the table the corresponding elevation and points of deviation are taken.*

This is important, for the officers and gunners are thereby absorbing the very information which under service conditions they cannot get from instruments, and which they must then either ignore, guess at, or know from previously absorbed knowledge.

There is in this connection a physiological fact worthy of consideration, viz.: what we sometimes consider intention is not really such. The mind cannot evolve a concrete fact, but all knowledge of such facts is the result of previous experience stored away in the mind and produced by it, when needed, without volition on our part, nay, even automatically and without the slightest link connecting it with the time and conditions under which the knowledge was acquired.

We travel over a new road and estimate its length, some of us quite accurately, but would this have been possible if we had not often traveled between other points whose distance apart was either marked by milestones or told to us by others who knew it. So with a good gunner. He reads the atmospheric instruments, feels the force of wind on his person and learns that this is a ten-mile wind; he looks at a given distance, uses his range-finder and stores up in his mind that this is 2000 yards.

It is necessary to do this not once nor twice nor yet three times, but many times before a scale is fixed in the mind, before one can depend with reasonable certainty on his estimate of these values.

This is an answer to the so-called "practical" school of artill-

* For some reason best known to those who made our sights the points are based on the 1-350 of the range instead of on the decimal system.

lerists who discard all auxiliary instruments in light artillery practice and would probably do the same in the heavy gun practice but for the force of lately aroused professional public opinion, submitting as a reason that they cannot be used with a battery in actual service.

They forget that this work is not actual service but preparatory to target firing, which is itself but a preparation for field service; and that this is merely a storing of knowledge and experience for use when most needed.

"The gun is its own range-finder" is for this school a sufficient answer to all propositions to use auxiliary instruments. But how will this work when a gunner cannot reproduce a shot or when the first shot, owing to lack of judgment, is so far from the target that the battery is knocked out before the gun can atone for the inefficiency of the gunner.

At present, in the absence of any authorized or furnished range-finder, the gun is indeed our sole hope, and for that very reason it must be backed up by educated intelligence, for, the more accurate the instrument is, the more accurate and intelligent the operator must be or the acquired percentage of possibility is lowered. With the old three-inch rifle guessing might pass muster, but with our new accurate and long-range piece, especially as war conditions now require a strong, quickly regulated, accurate artillery fire, not to eliminate, as far as possible, all genuine guessing, is criminal neglect.

There is one variation in conditions which unfortunately we cannot determine beforehand, viz., that due to deterioration of powder. This fact, so far from causing us to drop our attempts to obtain accuracy in other directions, is really a good reason why we should not do so. If we can with confidence estimate the other variations and still we miss our target, the source of error is at once patent, and half the battle is over when the error is recognized as arising from a *single* known source. Moreover, as there is a considerable degree of uniformity in the deterioration of a given lot of powder, if an opportunity is afforded for firing a shot or two, we easily read off the corresponding I. V. from our complete tables entered with the other known conditions and observed results.

The piece being loaded and aimed the sighting of the gunner will be discussed and verified both to correct any error he may have made, as well as to give practice in obtaining a uniformity

in sighting. The piece is fired, and the time of flight of shot is taken as a verification of the other functions in any subsequent reconstruction of the tables.

The importance of observation of shot can scarcely be exaggerated. The accuracy of our guns goes for naught and the piece as a range-finder and hard hitter is an abortion if educated observation is not brought to bear on its work. In the use of the time fuse the difficulty of observation is greatly enhanced. Locating the point of burst with reference to height above and distance from the target can be successfully done only by long continued practice and one cannot properly appreciate the difficulty till he has tried it.

All officers, and non-commissioned officers, will record their observations, even the cannoneers are encouraged to do so, for nature has not endowed us all alike and certain faculties capable of accurate and rapid development are often found where least expected. We must use all aids no matter whence they come.

The shot is marked by competent men as to point of striking or explosion in the air. In this firing the marking must not be by guess, otherwise the elimination of guesswork at the gun goes for naught.

Almost any man can by a little practice acquire a uniformity of stride sufficiently accurate and rapid for this work.

When this "marking" is signalled back it is compared with the recorded observations and each observer will endeavor to correct his mental scale.

If, from previous firing, the probable error of the gun is known and the shot has struck within this limit, a second shot is fired under the same conditions. If the point of fall is not within this limit, it is probable that a change in elevation should follow, but great care should be taken to investigate and verify the assumed conditions before any change is made.

Do not jump at conclusions, do not go too fast, but above all, *do not guess*. A guess pure and simple *may* make a hit, but, in the long run, it must prove disastrous.

All of this is tedious work and may result in firing but one or two shots in the forenoon; but what of that? Is our time too valuable to spend a few hours in studying our profession practically?

This slow and careful firing will be continued till, under known conditions, it is accurate within the limits of probable instrumen-

tal error for known ranges up to about 3000 or 3500 yards. A study is also made of the effect on jump obtained on ground, varying in degree of hardness and smoothness.

We now advance one step towards service conditions and take up target firing. At first this firing will be over carefully computed ranges and will differ from that just completed in the matter of the use of auxiliary atmospheric instruments, which will be gradually discarded, the rate depending on the proficiency acquired in the previous work.

When the target can be hit at known ranges with slow fire, this is changed to rapid fire and firing at will, following the drill regulations, in order to train all concerned to use the utmost care and at the same time to fire rapidly.

Here the accuracy of observation is tested, those conducting the practice depending on it for corrections; at the same time markers will privately keep the captain informed in order that he may, to save ammunition, check any grave errors. The field telephone when perfected by the signal corps will be invaluable at this time.

A previous practice of the Artillery Fire Game, translated from the German by Lieutenant Wisser, will now be of benefit to the officers in determining when the slow fire is sufficiently accurate to pass to the rapid, or in other words, in aiding them to quickly establish the fork.

It is impossible to enumerate all the details that must be looked after, or to grade them in a scale of importance; it is enough to interest good artillerists, who with their previously acquired theoretical knowledge will pick up the important details as the work progresses. In this I suggest that the men be encouraged to discuss the firing, as they may possibly call attention to things otherwise overlooked by the officers, and at the same time it will create an interest among them, making them more receptive to instruction, increasing their confidence in their weapons and so raising their morale,—a thing not to be disregarded.

Target practice will include indirect and high angle fire; the object being to put the shell in a given spot. All the care given to direct fire must be given to this, and as it is a relatively new experience, there will be required a correspondingly increased amount of patience and work.

Destruction of balloons presents another division of this work.

I gather from an officer of the Signal Corps that his department is in earnest in the matter of balloon service. We have the warning; it is fully time to begin on the problem.

The Signal Department I think will join with us in this work, but, if they do not, we can at little expense make paper hot-air balloons that will serve our purpose as targets.

TACTICAL FIRING.

In the division of Target Practice just completed the attempt has been merely to hit a given point. The ammunition used is preferably shell with combination fuse and with bursting charges specially prepared to give a quantity of smoke.

In the work now taken up we shall approach as near as may be to service conditions both in handling the battery and in selecting targets. These latter will simulate batteries in the open or masked or coming into position; troops advancing or lying down in the open or in hasty or semi-permanent works.

To construct and manipulate these targets will call forth the ingenuity of the officers and men. For the simpler ones we should undoubtedly be furnished with silhouette figures similar to those issued for small-arm practice.

Space prevents going further into the details of this part of the system. It can only be hoped that the mention below of some of the salient points of the problem will bear fruit by arousing the interest of artillerists. This interest must be aroused for a perfunctory performance will be of no good.

Many officers will not agree with the ideas presented in this paper, but its object will be attained if they take sufficient interest in the matter to give the system an honest trial, if merely to disprove its usefulness.

To return to the features of the problem mentioned above: We must experiment with and study the effects of the use of shell or shrapnel, with time or percussion fuses on these various targets. We should determine which is more effective against a firing line in trenches, the battering with shell, or the exploding shell or shrapnel by grazing the crest or in the air by time fuse. Also what kind of ammunition is most effective against a battery, 1st, coming into position and, 2d, already in place. And still again in street fighting whether the shrapnel should burst at zero line or on graze.

There are a great many things that we do not know about our

guns and ammunition. Ordnance reports furnish much information which is excellent in its way, but possesses the somewhat fatal defect of being the results of proving ground experiments. I believe in the efficiency of our guns within reason, but I further believe that an over estimate of their efficiency will, through the disappointment sure to follow, certainly engender demoralization and loss of morale. *We must know what the guns will do under service conditions.*

Good results must follow if, in the firing, we unite with it practical lessons in reconnaissance and field engineering.

Make a reconnaissance, report to the artillery commander the position selected, occupy it, make the predetermined defenses and fire a few shots at the enemy's position. On a subsequent day this position will be the target, and from a record of events kept with regard to time, a fairly good idea is had of the result of the supposed combat.

GENERAL REMARKS.

To carry out any systematic plan of target practice will require hard and continuous work, and often with very discouraging results.

The burden of these failures and discouragements will fall on those actively engaged in the work. These will rise again after defeat in the work, but, if hampered by technical difficulties in obtaining material, supplies, etc., their energy will be wasted. It is a fact, sometimes apparently lost sight of, that the line of the army is the important part of it. Without an efficient line no amount of staff will make an effective army. This work of improving the line is the one which should be foremost of all others, and unhampered by lesser matters. Many excellent plans, looking to the improvement of the line and emanating from the staff corps, are rendered abortive by their perfunctory execution, and the staff naturally grow skeptical as to the desire of the line to improve itself. Let us show a progressive spirit and I believe we shall receive all the necessary support.

Let us ask in earnest for all the instruments mentioned above, specially a range-finder and a stop-watch. For a range-finder, give us whatever is available—a sextant, a Pratt or Lewis range-finder or even a stadia is better than nothing. There should be a very accurate angle measuring instrument for the preliminary work, as well as the best portable one available for service conditions.

Morale. Of the greatest importance in determining the efficiency of an army is its morale, and here again we get good results from good target practice. The greater the success in this the greater will be our confidence in our ability to do well in service, and this, in itself, constitutes morale.

In making up a plan for target practice we must not fear to break through established routine. In generalizing the system all "competitions," as the term is usually understood, should be sedulously avoided. There will be a competition, in its broadest sense, going on all the time. The judges will be all the artilleryists who read the several reports of operations, and the standing of a battery in professional public opinion will be the prize.

Each captain will submit a plan for the practice of his battery and great latitude will be allowed him in its approval. He will make a full report after the practice, stating candidly his successes and failures, and, if possible, give a reason, not an excuse, therefor. These reports issued to all the light batteries will constitute the basis for the above mentioned prize.

The advantage of requiring the captains to originate their own plans is two fold: 1st. It does away with the feeling that this work must be done because it is ordered. 2d. Because it will put the officers on their mettle in suggesting and performing, and will give the service the benefit of originality or even genius that otherwise would be hidden.

The supply of ammunition may hamper the work at first, but with a good showing more will very probably be forthcoming. In order to economize ammunition it would be well to constitute three years a practice term and, under the present system, assign all three lieutenants to their respective batteries at the beginning of this term, to serve for its duration, and then to be succeeded by three others.

The captain being permanently assigned will act as a connecting link and give unity to the whole system.

TERRAIN IN RELATION TO MILITARY OPERATIONS.

BY CAPTAIN JOHN C. GRESHAM, 7TH U. S. CAVALRY.

VITAL truth is often couched in tritest phrase, though the tritest phrase is most apt to go unheeded. "Varies with the ground" are words so stale as to cause a smile instead of awakening thought of their vast import. Yet there is no problem in strategy or tactics where the ground does not enter as the great variable and controlling element. The history of war on every page makes evident the influence of topographical features. In military parlance, "terrain" means ground, and comprehends not only great geographical peculiarities of theatres of war, but minor accidents or inflections of fields of battle, of a skirmish line, or a sentinel's post.

It embraces also the nature of soil, whether hard or soft, rocky, alluvial, sandy, wet or dry, and includes artificial accidents such as ordinary roads, railways, telegraph lines, cities, villages, houses, etc. It will be interesting, first to cite a few examples of the effect of ground in the past, and then to examine the varied relation between terrain and military enterprises.

In the Civil War, the Union and Confederate capitals were the bone of contention in the East. These cities are little more than 100 miles apart. The country was fertile, fairly well peopled, and suited to all arms. The theatre of operations was about 200 miles square, and a long series of battles and combats extended through four years and ended little more than 100 miles from the first scene in the mighty drama. A contracted theatre with its great military advantages was due solely to the situation of two cities. In the West the main feature of the terrain was the Mississippi, whose possession would give to the North a great natural highway and line of communication, and deprive the south of the fertile resources of Arkansas, Louisiana, and Texas. There was no single point calling for such extraordinary defensive efforts and the course of operations was entirely different. The theatre of war was vast in area, operations far more varied and difficult, and illustrations of strategy grander and

more brilliant. Beginning at St. Louis in 1861, the struggle extended through the States of Missouri, Arkansas, Louisiana, Mississippi, Tennessee, and Kentucky, and was brought to a successful issue, after more than two years, at Vicksburg. At first the leaders were slow to recognize its controlling influence on the strategic plans to be adopted, but no sooner had the hostile governments awakened to the true state of the case than they devoted every energy, the one to retain, and the other to get possession of The Father of Waters. Soon after the fall of Vicksburg, General Sherman said: "That part of the continent of North America known as Louisiana, Mississippi, and Arkansas, is, in my judgment, the key to the whole interior. The valley of the Mississippi is America, and though railroads have changed the economy of internal communication, yet the water channels still mark the lines of fertile land and afford cheap carriage to the heavy products of it."

The striking differences between the Eastern and Western operations were mainly due to the magnitude and direction of a river. Again, the mountains, of West Virginia, east Tennessee, and east Kentucky, formed a great wilderness, crossed by few and difficult roads, where little forage and few supplies were found. This region constituted a great natural fortress, of easy defense; protected the valley of the Ohio to the north of it, from invasion, and was a strong curtain between the fronts of operations of the Union armies in the East and West.

At the battle of Perryville, Chaplin Heights enabled the 3d Corps not only to repulse the Confederates, but to send reinforcements to McCook, whose forces were demoralized, and on the point of being routed. The position of these heights, moreover, afforded facilities for a flanking fire of artillery, which together with the reinforcements, gave the victory to the Union. Vicksburg stands on the slope of that remarkable chain of hills that skirt the east bank of the great river for several hundreds of miles. At this point, the Mississippi washes the very foot of the bluffs which here are 250 feet high, and composed of tenacious clay.

This when cut vertically for roads or other purposes, retains its perpendicular sides for generations, the action of small streams has in the course of centuries resulted in cutting the bluff into deep ravines with steep sides separated by narrow ridges. The topography is extremely broken and complicated, and of such na-

ture as to render manœuvres impossible. On the other hand, it is perfectly adapted to purposes of fortification ; the narrow ridges having complete command over the deep ravines and their sinuous course, enabling each point to bring a cross fire in front of adjacent ground.

It took two years to learn how to overcome difficulties presented by the terrain no less than by the valor and perseverance of the Confederates. Some of us remember how at Cañon Creek, Chief Joseph was saved by our ignorance of the existence of a secondary cañon, whose prompt occupation by two troops would have cut off his retreat, and forced his surrender.

The ravine at Wounded Knee added greatly to our difficulties and losses.

The most important of all operations are marches, as on them depend the success of all strategic or tactical combinations. When roads are good, the rate of march for all arms is well known, and for an army corps about 14 miles per day. But deep mud, or steep slopes will defeat all calculations. After Ligny, Napoleon marched towards Brussels on the smooth hard highways of the country ; but Grouchy, pursuing Blucher, followed the ordinary country roads, which the heavy rains made almost impassable. At the end of the day, Napoleon bivouacked at Waterloo, having marched 17 miles, while Grouchy spent the night only 4 miles from Ligny. In the march on Atlanta, to get the artillery up the steep sides of Rocky Face Ridge, the pieces were dismounted and dragged up by ropes and tackle fastened to the trees and rocks.

Enough has been said to illustrate the effect of terrain as shown in history, and we may now examine more closely its relations to military operations. This examination may be made under the following heads, viz. : Plains, Slopes, Heights, Woods, Fields, Pasture Lands, etc., Villages, Defiles, Hilly Tracts, Mountains, Rivers, Positions, Cities and Communications, etc. A simple plain which offers no impediment to movement of troops, permits a clear view, but favors neither the attack nor defense, and would seldom be chosen by the latter except under the inducement of superior forces. An open plain intersected by obstacles such as ravines, ditches, canals and water courses, affords a clear view, but impedes movement of troops, and is especially unfavorable to cavalry. Such plain as a rule is better suited to the defense than the attack. A plain covered with woods, villages, hedges, but free from ravines, ditches, canals and water courses, obstructs the view,

and affords positions, screened from observation; but the fire of infantry and artillery will be much restricted. A country of this kind, however, affords facilities for sudden attacks and surprises. A plain with ditches, canals, etc., is said to be intersected, while one with woods, villages, etc., is called enclosed. A plain both enclosed and intersected is the most difficult terrain, and would rarely be selected as a field of action; but small bodies may find it advantageous to use such ground. It is generally accepted that the slope of ground affects the movement of troops as follows; up to 3 degrees, terrain is considered level. A slope of 5 degrees does not impede the march of troops, but is unfavorable to cavalry charging down hill. From 5 to 10 degrees, the march of formed infantry is fatiguing, and cavalry can charge neither up nor down. Up hill, artillery moves with difficulty, and down hill, has to put on the brake. From 10 to 20 degrees, formed infantry can move for short distances, but only with much fatigue and exertion. Formed cavalry cannot be used. From 20 to 30 degrees, formed infantry can no longer manoeuvre. As a rule, no military use can be made of ground above 30 degrees; except that individuals may overcome slopes of even this steepness. It must also be remembered that almost anything may be attempted over short distances, however great the difficulty. While plains facilitate, heights obstruct movements, and are therefore best adapted to the defense. But when accessible to artillery and commanding adjacent plains, they are good points of support for the offensive. The top of hill or mountain being the usual field for disposing troops, is most important; its form determines its value for defense. If the top be pointed or sharp, disposition is difficult; but if flat like a plateau, the hill will unite the advantages of plain and height; for there can be free movement above, while the slopes will obstruct or delay the enemy. Gentle continuous slopes permitting the fullest fire effects are best for defense; though they do not impede movement like steeper ones. A very steep slope causes dead angles of fire near the foot. A slope with concave, or convex surface cannot be subjected to a raking fire. Slopes composed of a succession of terraces permit disposition of echelons one above another, and give artillery fire in tiers. A position along the crest commands the slopes, and if slightly withdrawn, gives some cover, while allowing free view. Ravines parallel to the crest wholly or in part, interrupt the command of a slope, and assist the enemy in gaining the summit. Ravines

running wholly at right angles to the crest would be raked by fire, and be advantageous to the defense so far as they impeded the movements of the enemy.

In case of height against height, the dominating one has the advantage. In height against valleys, the latter are more disadvantageous than plains, in that they may be commanded on two sides. A line of hills is unfavorable, because the parts of forces holding them are separated. Woody regions generally strengthen lines of defense, and cover the concentration of troops. They afford good cover against fire, and are favorable to infantry when holding a position, or for marking a first advance and giving opportunity to prepare for a second. They interfere with unity of action and are unfavorable to cavalry and artillery. Untilled fields, pasture lands, and dry firm meadows form the best ground for movement of troops. Clayey soil and ploughed fields are difficult in rainy weather; wet meadows and marshy ground may be impracticable; and all these varieties are unfavorable to fire action, as projectiles are buried where they fall.

Villages and towns obstruct the march of armies, give cover to the enemy, and block approaches and communications. They may also form strong points of support to a position, like Aspern and Essling in 1809.

Any configuration of the terrain that cannot be passed by troops in broad front, and obliges them to break into narrow columns is called a defile. Bridges, dykes, roads running for long distances through more or less impracticable ground, as roads in valleys, hollow roads, roads passing between wide, deep ditches, or between high, thick hedges, or through forests and villages, are defiles, and are of great military importance. To debouch from a defile and deploy in presence of an enemy is a movement of great danger and difficulty, and a small force can often prevent such an operation on the part of much superior numbers.

Hilly tracts as distinguished from mountainous regions offer a practicable terrain, where roads are generally good, and positions are more frequent than in plains. In high mountainous regions communications are difficult and limited, population sparse, arable land scarce, and supplies scanty. Secondary mountain regions frequently offer facilities for operations, especially in a warfare of detachments, or when the retreat of a beaten army is to be protected. It is difficult to prevent the passage of an army over mountain chains, and positions taken for the purpose

are dangerous, as they may generally be turned. With proper precautions, however, fatal delays may be imposed on the enemy, and much advantage secured to the defensive. Strategically, mountain chains, like rivers, have two directions: when perpendicular to the line of invasion, they favor the defense; and if there are only a few passes, and these are strongly guarded, the army will find great difficulties. While holding the passes, the defense may menace the hostile communications and compromise their safety. When the offensive has crossed the range, it is still inconvenienced by defiles on its line of retreat and communications.

When parallel to the line of invasion, mountains permit the defensive to debouch upon the enemy's flank or rear through the defiles in his possession; and the invaders must secure possession of both slopes and of the defiles. Mountains, then, are always unfavorable to the offensive, and generally advantageous to the defense. In mountains, the sphere of reconnaissance is limited; little or no cavalry can be used, and it is difficult to observe the enemy. Infantry is almost exclusively employed, and artillery restricted to mountain batteries. When a river is parallel to the march of an army, it is a means of communication, and is sometimes the natural line for the invasion of a country. The Danube and the Po are striking examples. In this case the invader has a good support for a wing. A river is frequently used as a base of manœuvres, as was illustrated by Napoleon in 1813, when he made of Dresden a double bridge head. When a river is perpendicular to the line of invasion, it becomes a serious obstacle to the offensive, and an advantage to the defense. A wide, deep, rapid stream, defended by fortified places, makes a strong line of defense. The Adige was thus used by Napoleon in 1796, and enabled him with small forces to beat all the armies of Austria. Concerning rivers as lines of defense, Napoleon says: "A river, be it as wide as the Vistula, and as rapid as the Danube at its mouth, is nothing, unless there are means of crossing to the other bank, and a head quick to seize the offensive. A line such as the Rhine or even the Vistula, can be held only by occupying the bridges, which will give opportunities for taking the offensive. A river has never been considered as an obstacle which would cause more than a few days' delay; and its passage can be defended only by placing troops in force at the bridge heads upon the further bank, ready to take the offensive as soon as the enemy commences his crossing."

But when the assailant has succeeded in crossing, he finds a serious obstacle upon his line of retreat and communications. The way to defend a river or mountain chain, is to concentrate one's army at a convenient distance from either, and to place along the crest or the bank troops of observation only, who will give timely warning of the enemy's approach, as well as retard his advance as much as possible. The bulk of the defensive army will then be in hand and free to march in any direction.

All regions where armies may operate offer more or less advantageous positions. In a defensive position, it is essential to estimate the forces necessary for its defense, and if it be too extended to be properly occupied by the forces in hand, it must be abandoned, and another sought. No fixed rule can be given as to the number of men per lineal yard, but as a general rule, in ordinary ground, and including reserves, 4 men may be a basis of calculation. A position should give good command of ground in front, afford cover, and be strong on the flanks. It should allow the defender free movement in rear and front. Obstacles to the approach of the enemy are good, unless they obstruct the offensive return of the defense, or protect against his fire.

Great cities are centres of resources, and their possession gives depots for armies. Fortifications and entrenched camps commanding great lines of communications, whose influence extends over large areas, are powerful obstacles to an invading army. A large part must be consumed in masking such places, or the whole army must be delayed for regular siege; in any case, they are a great advantage to the defense. Communications are the most important topographical features. These are railroads, ordinary roads, and water routes. Railroads have caused great changes in theatres of operations. They are always accompanied by telegraph lines, and with the latter have greatly abridged time and distance in the concentration, supply, and reinforcement of armies, as well as in the transmitting of orders and intelligence. They can, in a few days, transport to great distances large bodies of troops and quantities of supplies; and a state controlling a good system of railways may concentrate its army and establish magazines on the frontier before one less fortunate is ready to act. But railroads have a great influence not only on the beginning, but on the whole subsequent conduct and character of the war. They widen the field of combinations and enable an army to draw to itself troops and supplies from all parts of the territory.

Its base of supplies is coextensive with the territory, and its magazines unlimited as the resources of the country. Sick, wounded, and prisoners are readily sent to the rear, and no longer burden the army.

Railroads and telegraph lines play an important part in front of armies before the beginning of operations, and in their rear during the progress of the campaign. Those between the belligerents are destroyed by the side compelled to retreat, and reëstablished by the one continuing to advance. Important railway centres will always be of great strategic value, and will doubtless give rise to great battles. Bases of operations have been transformed by railroads, and supplies formerly collected upon bases, will henceforth be distributed along them. There should be a sufficient number running from the interior to the frontier to assure prompt concentration of the army. An illustration of the effect of railroads may here be given.

Though our railroads were far less numerous during the last war than now, the 11th and 12th Corps, numbering 23,000 men, with artillery, trains, baggage, and animals was moved 1200 miles in 7 days, in 1863. One hundred days would have been required under the most favorable conditions to have moved them on foot. In his march to Atlanta, Sherman depended on a single track. One-third of this was destroyed in front of him, but its repair did not delay his army, as his construction corps of 5000 men rebuilt 3 or 4 miles a day. An army fighting its way as his did, does not move much faster than this. When he reached Savannah, a fleet of transports was awaiting him, loaded with construction corps, locomotives, cars, rails, and all other appliances. As Sherman did not need them, they sailed back to Wilmington and Beaufort and built a railroad 90 miles long in rear of Schofield's army to Goldsborough, N. C. On reaching the latter place, Sherman found trains loaded with supplies of all kinds, ready for use. It is readily seen that telegraphs were hardly of less importance than railroads, and if the 11th and 12th Corps had not started until an ordinary courier had traversed the distance and borne them the order, they would have required about 4 months to appear on the Tennessee where their services were so much needed, and where, thanks to railroads and telegraphs they arrived in 7 days.

The rapid transportation of supplies and men, and the lightning quickness with which intelligence is transmitted, are marvels

which generals of past ages would have thought manifestations of the supernatural. But nowadays, notwithstanding the great effect of railroads, ordinary roads have lost none of their importance; and must still be used by armies in active operations. As a rule, when an army crosses the frontier of an active or even respectable adversary, the use of railroads will be no longer possible, except for the transportation of supplies and reinforcements and sending back sick, wounded, prisoners, etc. The army will have to march as of old, and should have plenty of good roads, with hard smooth surface, and gentle grades. When parallel to the line of march, water courses are excellent means of transportation. In such cases both banks of a river must be held or controlled, and there must be certain and speedy communication between the sides. All boats must be collected far and near for the use of the army. In 1809, Napoleon thus used the Danube, and besides supply boats, had 400 others in which 10,000 men could cross the stream at a time. He wrote to his chief of staff that there must be no Danube so far as free communication between banks was concerned.

The subject of terrain is the greatest in military science, and the short sketch here given may convey some notion of its importance. Much attention is paid to practical and theoretical instruction in terrain in foreign countries; and such was the case in Prussia prior to 1870. The German officers were much superior to the French in this regard, and even the non-commissioned officers and privates had been constantly instructed in use of ground.

Reprints and Translations.

MILITARY JAPAN AFTER THE WAR.

BY LIEUT. COLONEL E. G. BARROW.

(From the *United Service Magazine*, London.)

IT is now just two years* since I published in this magazine an article under the title of "Military Japan." The account I gave therein of the military forces of the Mikado may not have attracted much attention at home, but in the Far East, more especially since the war, it has been the subject of considerable comment. At the time it was supposed I had taken too optimistic a view of Japanese military organization, and had not given sufficient credit to the latent resources of the Chinese empire. Events have, however, proved that the praises lavished on the Japanese were well deserved, and that I had accurately gauged the probable results of a contest between the two powers. Those results were then, to those who chose to study the question, as certain as the courses of the stars in heaven, but the astonishing fact remains that the easy and overwhelming success of the Japanese arms came as a surprise to Europe.

To-day, however, fickle popular opinion has reversed its judgment and rushes headlong to the equally amazing conviction that Japan is a serious menace to the European powers. It would therefore seem time to review the situation from a military political point of view.

What have been the results of the war? Stated in brief general terms they are these: 1st. The great Chinese imposture has been exposed and the weakness and corruption of the empire laid bare. 2d. Japan stands forth as a civilized power and as a military factor of first-rate importance in the far East. 3d. Japan has acquired a commanding position and a pre-eminent interest in the affairs of Corea. 4th. Antagonism between Russia and Japan has become a principal and permanent factor in the politics of the Pacific. 5th. The acquisition of Formosa has provided a valuable outlet for the superfluous population of Japan.

As regards the first of these factors I wrote in 1893: "Great Britain, in common with other European states, pays great regard to the susceptibilities and pretensions of an effete and corrupt government like that of China, and it has become the fashion to regard the Chinese factor, as it is called, with some apprehension; but no one who knows the helplessness of the imperial government, or who has seen the ignorant antipathy of the Chinese for all 'barbarians,' can suppose that an alliance with China is ever to be relied on, or that China would prove a really formidable antagonist."

* *Vide the United Service Magazine* for September, 1893.

The truth of this estimate has been proved to the hilt, and China, instead of being an object of dread, is now regarded as the rich man of Asia, whose flabby, festering empire, like that of the sultan, only continues to exist owing to the jealousies of the powers, a Gordian knot which will some day be severed by the sword and genius of some new Cortez. Thus has Japan altered the whole military situation in the Far East. The millions of China are now regarded not as the potential military forces of a possible enemy or ally, but as the probable subjects of the victor in the future scramble for Asiatic empire. What India was during the decadence of the Moguls in the eighteenth and nineteenth centuries, that inevitably must be the fate of China with the downfall of the Manchu dynasty in the century now commencing. At first a prey to rival nations, struggles like those of Clive and Dupleix may be repeated on the banks of the Yang Tse and the Mekong, but the ultimate destiny of China is writ large on the horoscope of the world, the climax of those rivalries must be that China becomes a stupendous dependency of whatever power definitely acquires the mastery of Asia. *Mene, mene, tekel upharsin.* This may be regarded as a fantastical and unsupported assertion of irresponsible opinion, but nevertheless it is a rational deduction from the analogy of history. We have in China the same causes, the same elements, which brought about in India the substitution of foreign for native rule. On one side a tottering imperial autocracy, similar to that of Aurangzib and his successors; semi-independent vice-royalties and autonomous provinces, in many respects resembling the loose relation of the feudal states of India to the central authority; an official class as corrupt, ignorant and self-seeking as any Indian court could produce; great unpaid armies without leaders or discipline such as Clive and Wellesley so easily destroyed; and a people without patriotism ready to sell themselves to the highest bidder. While on the other side we have in the coast ports a reproduction of the Indian factories, in the commercial rivalries and political jealousies of foreign nations all the elements of intrigue and interference with internal affairs, such as the European adventurers of the eighteenth century so effectively utilized to their own advantage; and finally in the necessities of commerce the same incentives to political aggrandizement which the East India Company found it so hopeless to resist. This pricking of the Chinese bubble, this change in the attitude of Europe towards China seems to me to be the first and most important feature in the revolution in Eastern politics created by the military triumphs of Japan. The second factor is the military position assumed by Japan, and its true value in relation to the other Eastern powers—England, Russia and France—and in considering this it is necessary to review briefly the lessons of the late war.

In 1893 I wrote that Japan presented the picture of "a nation with a standing army, which, for efficiency, would take high rank even in Europe, and which has but little to learn from any but the very best. A nation which, in a military sense, is itself invulnerable, and yet is perfectly prepared to play a great part in Eastern Asia when the Korean question comes up for final adjustment. * * * The Japanese soldier has discipline, perseverance and great endurance, which go far to create the true martial spirit. * * *

Given a good organization, a thorough practical military training, and the above-mentioned qualities, it is impossible to deny that the Japanese army is one that has to be taken seriously." Those conclusions and deductions have now been fully realized. The Japanese soldier has shown his metal; the Japanese staff has scored high honors in the school of active service. The Japanese army is now taken seriously by the world at large, and the Japanese nation has played a great part in the first act of the Korean drama. All this is beyond dispute; but, at the same time, it can hardly be said that the *fighting* qualities of the Japanese soldier, or the capacity for command of the Japanese officer, have been very severely tested. If we examine the reports that have been published, it is quite clear that the Chinese never showed much fight. Take what we may call the campaign of Port Arthur, where the Chinese forces were not only well armed, but generally held positions of extraordinary strength, and we find the Japanese losses to be as stated in the table on the following page. So that the whole of these operations, resulting in the annihilation of a Chinese army and the capture of one of the strongest fortresses in the world, only cost the Japanese about 45 killed and 350 wounded, a result which, without any discredit to the Japanese, shows that the resistance offered was of the most contemptible nature. In fact, to quote a happy expression of the *Times* correspondent, as far as fighting is concerned, the Japanese army has, as yet, only gone through "a smooth-water trial." No one has a greater admiration than I have for their really marvellous organization, and for the qualities of discipline, patience, endurance, and devotion to duty, which soldiers and sailors of all ranks have displayed, but we have yet to learn whether when opposed to foemen worthy of them Japanese generals will be capable of directing their forces with like success, or Japanese officers of leading and controlling their men with the same order and method.

	Killed.		Wounded.	
	Officers.	Men.	Officers.	Men.
At the advance-guard action of the 4th October, } and the attack at Kinchow, October 6th. . . }	Nil.	Nil.	1	A few.
Capture of the Talienswan forts on the 7th October	Nil.	Nil.	Nil.	Nil.
Advance-guard action of the 18th October.	1	11	1	32
Action of the 20th October.	2
Capture of Port Arthur, 21st October.	2	17	8	243(?)
Chinese attack on Kinchow, 21st October.	1	8	Nil.	48
Second attack on Kinchow, 22d October.	Nil.	5	Nil.	11

We may readily assume that even third-rate European generals would deal as effectively as Marshal Oyama with the child-like strategy and tactics of mandarin commanders, but we may be permitted to doubt whether Japanese officers would find troop-leading so simple a business, when, instead

of flaunting banners and the fireworks of half-trained coolies, they had to face the deadly hail of shrapnel and the crash of well-ordered volleys from disciplined troops, their equals in courage and patriotism. To talk, therefore, of the Japanese army as the equal of a European one, or to speak of Japanese military power as a menace to Russia in Siberia, or to England in India, is totally unjustifiable until the rude test of real war has proved the Japanese title to rank as a military power of the first order.

In my former article I said: "I am quite certain that well-commanded Japanese infantry are quite as good, from a drill or manœuvring point of view, as the majority of our Indian regiments." But they have done nothing that our own regiments would not have done equally well, and even after their brilliant success in the late campaign, I still only rank them with the Sepoys of the Punjab and Bengal armies, while I also still believe that our officers—I mean the British officers of our Indian regiments—are superior to their Japanese *confrères*.

What the war has proved is that Japan possesses an army splendidly organized and trained, capable of doing as good work as any troops in Asia *if properly led*. That army can put in the field seven thoroughly efficient divisions, each about 14,000 strong, so that it may safely be estimated that Japan can mobilize nearly 100,000 men for her field army, irrespective of the reserves she mobilizes for garrison duties at home. Such a force is a factor of great importance, and might indeed have a preponderating effect in the future settlement of those great political questions which will surely agitate Eastern Asia before many years have elapsed, but the application of that force depends entirely on the command of the sea, a truism which has been amply illustrated by this very war. The caution which Japanese strategy at first exhibited was clearly due to the fact that they had not undisputed command of the sea, and might by a naval disaster, be placed in a very critical position. After the battle of the Yalu, however, the Japanese position at sea became comparatively secure, and the immediate effect was a bolder strategy. The brilliant campaign of Port Arthur was the first fruit of the altered situation after the capture of Port Arthur, but even then there was no real disposition to attempt a march on Peking or Moukden until the last remnant of the Chinese navy had been destroyed at Wai-hai-wai. When that feat was accomplished, the Chinese position became hopeless, even in mandarin minds, and only peace could save the capital, and with it the dynasty. Then came the most convincing lesson of all. Russia insisted on a withdrawal from the Liao Tung Peninsula, and Japan had at once to give way, simply and solely because Russian naval power was more than a match for the Japanese fleet, and a defeat at sea practically meant the destruction or capitulation of the army in China. The moral of these lessons is, that without the command of the sea the Japanese army, excellent though it be, is as incapable of executing aggressive designs against Siberia, China, or even Hong-Kong, as those of the unfortunate Queen of Madagascar or the Prince of Monaco. If Japanese military force is to become a factor in the future settlement of Eastern Asia, it can only be so by Japan gaining the command of the sea, either by an immense development of her marine forces or by seeking a naval alliance.

The third notable result of the war is, as I have said, that Japan has acquired a paramount position and interest in Corea. Whether she be right or wrong in assuming that position it is needless now to inquire. The point for consideration is whether she can maintain it. On the other hand, it is obvious that Russian hopes and interests are seriously compromised by the growth of Japanese influence in the Korean Peninsula, and it is only reasonable to suppose that Russia will thwart that influence in every possible direction even to the extent, if an opportune moment arrive, of demanding Japan's withdrawal. Under these circumstances it is equally obvious that unless and until Japan becomes relatively more powerful at sea than Russia with her satellite France, the position of the Japanese in Corea is, in a military sense, quite untenable. Should she, however, either by her own unaided efforts or by a naval alliance, at anytime acquire maritime superiority, she will undoubtedly be able to retain her hold of Corea for many years to come, as the Russian land forces in the Amour Provinces would hardly be equal to the task of ejecting her.

The fourth great result of the war is the permanent antagonism which has arisen between Russia and Japan. This antagonism is a perfectly natural one, as the interests of the two powers clash in every direction, more especially so since the occupation of Corea. Russia seeks a port in the open sea in place of ice-bound Vladivostock as her terminus for the great Siberian railway. There would seem to be only three possible, or rather three suitable, points for such a terminus—Port Lazareff, Port Arthur, or Niuchwang. There are many objections to the situation of the first-named port, and probably Russia has already decided to make Port Arthur the goal to be acquired by diplomacy or force. In any case whichever point may be eventually selected, that point is distinctly menaced by the Japanese position in Corea. Moreover, apart from this, Japanese sentiment has been mortally wounded by the part Russia has played. Russia has deprived her of the fruits of victory and humbled her pride, an affront which will never be forgotten. In short, if there be one factor in Eastern politics, on which we can safely reckon it is the antagonism of Russia and Japan. It is for British diplomacy to profit by that antagonism. This is a point to which I shall revert at the conclusion of this article.

The last result of the war to which I will refer is the acquisition of Formosa. When this clause in the treaty of peace was announced there was a general feeling amongst Englishmen in China that such a step would lead not only to a loss of the practical monopoly of British trade in Formosa, but that the Japanese position there would be a distinct menace to Hong-Kong. Uninstructed public opinion was aghast at the idea of a strong power seated within twenty-four hours steam of Hong-Kong, and there was a strong feeling that we ought to protest against this annexation. In my opinion such fears are utterly unfounded. As regards the first point, Japan, with its youthful energy, will rapidly develop this rich and beautiful island. Harbors will be created, roads and railways constructed, trade and agriculture fostered, mines and forests opened up. Immigrants from Japan will fill the waste places, and good government will take the place of a rapacious and petrifying misrule. All these changes in the condition of the island point

to increased facilities for trade, and it is for the British merchant to foresee and avail himself of these openings, and to adapt himself to altered conditions rather than to lament the loss of a restricted market which till now he has looked on as peculiarly his own.

As regards the second point, it seems to me immaterial whether the Japanese are in Formosa or three days farther off at Nagasaki. If they have not the command of the sea they are no more a menace to Hong-Kong than are the Germans to Margate, and if they have that command the difference in distance is unimportant. Indeed it is always the mother country that must be the base of an expedition. If we were invading Syria or Palestine it would be England itself, not Cyprus, that would be the real base of a maritime expedition, and the true menace to Turkish authority.

Now that I have summarized the main results of the war and pointed out under what conditions the military forces of Japan are really formidable, I may proceed to discuss in what respect that military power may be directed toward the maintenance of a balance of power in the Pacific that shall not be detrimental to either Japanese or British interests. I have indicated how in the absence of maritime power the Japanese position in Korea is untenable; on the other hand I have pointed out how that position may be a direct menace to the Trans-Siberian railway and its terminal port. In both cases the advantageous solution of the question depends on the relative naval power of Russia and France as compared with that of Japan alone or Japan with an ally. Japan alone can hardly hope to obtain the command of the sea in these waters, for every advance she makes towards that position will be met by a corresponding effort on the part of Russia and France to maintain their present preponderance. Under these circumstances her best policy would seem to be to court an alliance with the only naval power that can definitely assure her maritime security. On the other hand, Great Britain, like Japan, has vital interests to protect on the Pacific littoral, interests which extend from the Great Wall to the Tonquin frontier; but without military force to back her present doubtful naval superiority in Chinese waters, it is difficult to imagine how those interests are to be safeguarded. A Japanese alliance would seem to solve that difficulty. The naval power of Great Britain, backed by the military forces of the Mikado, would give such a combination a commanding voice in the affairs of the Far East.

In 1893 I wrote: "The Korean question will certainly be mixed up with the larger question of Russian supremacy in the waters of the North Pacific, in which England herself will be directly interested, so that there are many combinations more improbable than an alliance at some future time between England and Japan for the settlement of this question." That alliance has now been brought within measurable distance. Russia is endeavoring to assume a dominating position at Peking. France is becoming restless with regard to her influence in Yunnan and Northern China. The commerce and prestige of England are distinctly threatened all along the line, while Japan is losing the main objects for which she fought so gallantly. It is vitally important to both England and Japan that the present trend of political affairs should be arrested, and the balance of power restored. The

only feasible means of accomplishing this object would seem to be by establishing the alliance foreshadowed in 1893. If, on the contrary, we leave the march of events to fate, then assuredly the political orbits of the powers concerned will converge more and more rapidly towards a cataclysm that will shake the world.

INSPECTION OF FOOD FOR TROOPS.

BY CAPTAIN J. J. MILLER, NORTH MELBOURNE BATTERY, G. A.

(From the Journal of the United Service Institution of Victoria.)

THE title of this paper may at first sight seem strange, as emanating from an artilleryman, but my attention was first forcibly brought to the subject of food supplies to soldiers when reading some statistics of the Medical History of the American Civil War, a record of which the Medical Department of the United States Army may well feel proud. Some of these figures I will give you a little later on. Again, the frequency with which I have, in my ordinary calling, encountered diseases which were distinctly connected with unsound food of various kinds, suggested the question—If in a civil community, living in a state of repose, we are unable to fully guard ourselves against this danger, how much greater will it be amongst combatants, living in a state of intense excitement, and uncertain of their movements, dependent for supplies upon army contractors, magazines and requisitions limited to time, the commissariat thinking mostly of quantity, and the medical staff, upon whom the obligation of inspecting rations theoretically rests, without the time to devote to this duty with the sick and wounded on their hands?

I thought that under the circumstances a few notes about the adulterations of some foods, the purity of others, and the diseases of perhaps the most important group, viz., the meat foods, which are liable to affect man, or to be transmitted to him as a specific disease, would not be out of place, as in time of war the company officer must always have a large share in the comfort and health of his men, as I need hardly tell you nothing hampers an army more than having a large sick list. I purpose to give a few rough and ready methods of inspecting the principal foods used by the soldier, and perhaps I may be permitted to digress a little now and again, and break up a little new ground.

When dealing with military subjects we are apt to look upon our tactics, our arms; our morale, as the great essentials to success. Our military literature teems with flank movements, effective range of artillery and infantry fire, and the advantages of position for defense or attack, until we—more especially in a force like ours—completely lose sight of far deadlier enemies than the bullets or sabres of our foe. The glory of war receives a rude shock under the cool examination of the scientist, and I have little doubt but that many an old fighting officer was more frightened of the unseen than the seen foe.

The following figures, taken from "The Medical and Surgical History of

the American Civil War," are startling: The total deaths of the Federal army numbered 359,496—over 15 per cent. of the entire number of enlistments. Of this number 224,586 died from disease (nearly two-thirds). The remaining 134,910 (a little over one-third) were killed in battle or died from the effects of wounds.

These figures speak for themselves as to the necessity of careful hygiene amongst troops; but, when the cause of death from disease is looked into, a light is thrown upon the subject which it is impossible to neglect. Dr. Woodward is quoted in Rohé's text-book of Hygiene as estimating the total number of deaths from diarrhœa and dysentery as 57,265, or in the proportion of one death from dysentery and diarrhœa to three and a half from all diseases.

Among the prisoners held by the Confederates, according to Rohé, the deaths from the two diseases reach as high as 76 per cent., proper records being kept. "The food was bad in quality or badly cooked, the water impure." Of course, other hygienic conditions were at fault, but the exciting cause seems to have been without doubt improper food.

The following table, taken from "The Medical and Surgical History of the War," Vol. II., p. 2, is also instructive:

TABLE XXII.

Total deaths from diarrhœa and dysentery, U. S. Army, May 1st, 1861, to June 30, 1866:

	Cases.	Deaths.
Acute diarrhœa.....	1,269,027	4,291
Chronic diarrhœa.....	182,586	30,836
Acute dysentery.....	259,071	5,576
Chronic dysentery.....	28,451	3,855
Total.....	1,739,135	44,558

These figures are fairly convincing; but the statements of Surgeon Clark, of the U. S. Army, in his excellent article on "Camp Hygiene," in *Buck's Hygiene and Public Health*, on the etiology of food diseases, need more than a passing notice, and I hope you will not accuse me of over-compiling if I give them to you at length. Dr. Clark says: "A reference to the causes, which mostly prevail in camps, is all that is needful to indicate the sanitary measures for the suppression of diarrhœal proclivities. As in civil life, improper food and improperly cooked food furnish most of the causes of local irritation. Insufficiently masticated food might be mentioned, but the cases to which it gives rise are sporadic; yet even here the hard bread and beans of the camp ration tend to enlarge its field of operation. The improper foods include all articles which have suffered damage from imperfect preservation, and meat which on the hoof has been overdriven, badly fed, or affected with disease, or which has been kept too long in the slaughterhouse after killing, or in the haversack after issue or cooking. To these must be added an ignorant indulgence in many articles, in themselves either proper or improper, into which troops are impelled, when opportunity offers, by the sameness of their diet under ordinary circumstances."

As Dr. Clark says: "If the soldier is a machine, as he has sometimes been called, he should be kept in good repair, and well supplied with motive-power." "Armies," says the same writer, "have been disarmed by a deficient dietary, but never by the overfeeding consequent on the establishment of a liberal ration."

The object of this paper is to give the company officer a few hints in choosing this human fuel, to give a few rough and ready methods of testing its fitness for its purpose; the only apparatus necessary being his own senses and a few brains, surely not much to ask of a man who holds the lives of others in his hands. I will only deal with the official list as laid down in our own Standing Orders. The question of what foods are advisable for troops on service is too large for a short paper like this.

WATER.

Pure Water.—Colorless, or bluish tint; transparent, sparkling, and well aerated; no sediment visible to naked eye; no smell; taste palatable.

Usable Water.—Colorless, or slightly greenish tint; transparent, sparkling, and well aerated; no suspended matter, or else easily separated by coarse filtration or subsidence; no smell; taste palatable.

Suspicious Water.—Yellow, or strong green color; turbid; suspended matter considerable; no smell, but any marked taste.

Impure Water.—Color, yellow or brown; turbid, and not easily purified by coarse filtration; large amount of suspended matter, and marked smell or taste.

Water of a green color is of less danger than one of a yellow or brown; the tint in this case being principally due to vegetable matter. The yellow tinge is often due to contamination from sewage. The source of the supply, when possible, should be ascertained. A well-known instance is that of some American troops camped near a stream—fever broke out among the men, and upon inquiries being made it was found that an outbreak of "trapper's fever" had occurred several miles up the stream, and the drainage from their camp entered it.

TEA.

I suppose I must call tea the national drink of Australia, or, at least, what we think is tea. For the soldier it is, perhaps, the most valued drink he can have; it is stimulant, it checks tissue change; it is, moreover, useful to him as a means of purifying his water, not only on account of the water being boiled, but also on account of the presence of tannin in the leaves. Great care should be exercised in selecting tea, adulterations are frequent; spent tea is redressed, foreign leaves, such as the willow, elder, hawthorn, beech, oak, and others commonly added; black lead, gum, indigo, Prussian blue, clay, plaster of Paris, are all common. In tea dust, which is used in blending, iron filings and magnetic oxide and sand are often present.

The main points in the choice of tea are the smell and taste of the infusion. About the weight of a sixpence to a cupful of water, according to Parkes, is the strength. The aroma should be fragrant, the color not too dark, and the taste not bitter. When the infusion is made examine the

leaves, the true leaf is characteristic. The veins running from the midrib do not reach the border of the leaf; they loop in, leaving a distinct margin. The edge of the leaf is serrated, but the serrations stop before reaching the stalk; the serration is regular. These signs can be readily seen by stretching out a tea leaf upon the side of a glass, and holding it against the light.

In addition to foreign material, tea may be adulterated with spent leaves; in such a case the liquor is nauseous and the body thin. In other cases, leaves which have fallen to the ground and fermented are prepared as good tea. In green tea, Prussian blue is used to give a coating to the tea; this may be tested by washing the coloring matter off the leaves in a test tube.

During the past year compressed tea has been introduced, and at first sight would appear to be excellent for military purposes. The tea is good, but soon becomes nauseous, as most of the stalk is removed, little tannin is left, and as a purifying agent for water the value of the tea is reduced. I have been fortunate in securing a few samples of good and bad tea from sources which I will acknowledge later on; they are:

1. Good commercial tea.
2. Hang Mee, much adulterated.
3. Canton "Gunpowder," adulterated with "Prussian" blue and gypsum
4. Ceylon Congou, nearly all foreign leaves.
5. Rotten Congou (Panyong), fallen leaves.
6. Ceylon dust, containing sand and magnetic oxide.
7. Russian Brick tea.
8. Tabloid tea.

If you look at the sample of healthy tea you will find that the leaf is not much broken up, that there is little foreign matter, that the leaves are of a dirty-brown color, and the aroma is pleasant and well marked.

The Russian Brick tea I show more as a curiosity; it is tea dust mixed with bullock's blood and gum, and is used by Tartars and poorer Mongolians.

COFFEE.

Coffee is an important article in the diet of the soldier, and is hardly used enough. Like tea it is subject to adulteration, the principal being—chickory, carrots, peas, almond shells, burnt sugar, etc. Under the microscope fraud is at once detected, but the only available methods we have are to judge of the aroma and color of the infusion. If coffee is thrown upon cold water, "pure coffee swims longer than any of the ordinary adulterations and colors the water slowly, chicory sinks and colors the water rapidly." The infusion of pure coffee is light in color, the black coffee we see is more often chicory. The grains of ground coffee are hard and crumble between the teeth, chicory is softer and does not crumble.

MEAT.

Of late years the relationship and interdependence between man and the so-called lower animals have been more clearly established—diseases thought to be peculiar to man have been found common to both; parasites

go through their various changes in both, *e. g.*, the bladder worm of the ox becomes in man the tape-worm, scarlet fever and tubercle of the cow are identical with the same diseases in the human being. Zola, in his great work, "The Downfall," brings forcibly home the importance of healthy meat. Any of you who have read this book will remember where the German captain comes to old Fouchard, the French butcher, and says—"You know very well that the three cows you sold us last Sunday were rotten; yes, rotten, or rather, diseased; killed by some disgusting complaint, for the meat has quite poisoned my men, and two of them must now be dead." Upon the Prussians leaving, Fouchard, who has agents buying diseased meat for him, says to Henriette—"And to think, little one, that some folks say I am not a patriot. Not a patriot, indeed! Why, I have killed more of them with my rotten cows than many soldiers will have killed with their chassepot!"

While preparing this paper I read "The Guide to Meat Inspection for Regimental Officers," published under directions from the Q. M.-G. of the Imperial army, I must say, with a feeling of disappointment. As a guide to an ordinary regimental officer it is worse than useless. A few rough rules are given as to the appearance of unhealthy meat, but the whole book seems to be taken up with the question of deciding whether beef is bull or ox, or mutton wether or ram. The significance of different diseases and their detection is not recognized to its full value, and an ordinary lay officer leaves with the impression that the difference between the unsexed animal and the one retaining its full functions is a matter of great moment in the inspection of a carcass. Such points are, doubtless, important in seeing that the terms of a contract are fulfilled, but help us little in deciding upon the value of meat and its fitness for food. I grant that the flesh of the ram and bull is coarser and stronger in flavor than wether or ox, but, at the same time, if the animal is healthy the meat is good and wholesome.

I will deal with the inspection of meat in the following way, so as to simplify matters:

- I. Appearances of healthy meat;
- II. Changes due to putrefactive decomposition;
- III. Appearances in meat, due to the animal being killed while feverish or suffering from acute disease;
- IV. Appearances due to chronic wasting disease, *e. g.*, fluke, advanced tuberculosis;
- V. Points in the examination of meat for the detection of special diseases.

I.—*Healthy Meat.*

The color should be that usual to the animal from which the meat is taken, *e. g.*, the tint is paler in mutton than beef, and paler still in veal and pork than in either mutton or beef. Any marked change in color is suspicious. The flesh should be firm, elastic, and juicy to the touch; the odor sweet and pleasant. The lean should be finely grained with fat throughout, and when cut across the muscles should be the same color throughout, or very slightly paler in the centre. The fat should be firm and greasy, and in good quantity. If the part of the meat to which the kidneys are attached

is present special note should be taken of consistence of the kidney fat. Do not think that because an animal is very fat that it is necessarily a sign of good health. It is a characteristic of ruminant animals that when a deposit of disease takes place in an important organ, that that organ, in its endeavor to throw off the poison or parasite, is stimulated to greater activity, its functions are better performed, and for a time the victim thrives rapidly. This fact is so well known that some breeders have been known to place their sheep upon pastures infected with fluke before sending them to market. The same thing also happens in the bovine tribe in the incipient stages of tubercle.

II.—*Changes due to Putrefaction.*

The first stage of decomposition is marked by a change in color of the flesh, which becomes paler. The muscles are softer. The odor is unpleasant. A good plan is to chop up a little of the meat and pour warm water upon it; the slightest taint is then readily noticed, or even in many cases the smell of medicines with which the animals have been drugged. Another method is to take a long perfectly clean knife, pass it quickly down into the centre of the meat, close to the bone, applying the blade to the nose immediately on withdrawal; very faint odors can in this way be detected. This method is the best for examining corned and salted meats, bacon, etc., the knife should go into the thickest part, and down to the bone. The green flesh and disagreeable odor with the crepitant feel in advanced decomposition need no description. It is always unsafe to allow any meat to be used in which decomposition has once set in.

III.—*Appearances due to Fever.*

This class of meat in a civil community is rarely noticed, the flabby meat of chronic disease being the most frequently condemned. Yet for the military officer this is the class which ought to receive his special attention. Cattle have often to be driven with troops, and slaughtered without proper rest, they are killed when their temperature is raised above the normal height, and immediately animal poisons develop, called ptomaines; meat of this class is highly dangerous, it rapidly undergoes putrefactive changes, in most cases will not pickle well, and is dry and harsh in character. The veterinary surgeons of Paris point out the the following changes, which I take from *Palmberg's Public Health* :

- a. The meat is more or less dark and of a dull tint.
- b. The inner (adductor) muscle of the thigh has a grey, earthy or ochreish tint.
- c. The lining (serous) membranes of the abdomen and chest are furrowed with branchings of a leaden grey or livid color, produced by hypostasis.
- d. The suet and fat exhibit more or less vascular injection, giving the appearance of being streaked with wine.
- e. A purplish discoloration of the loins a sign seldom wanting.
- f. The muscular tissue is less firm.

The meat has not the fresh sweet odor, the smell is unpleasant, more especially marked on incision of the thighs and under the shoulder-blade.

When the muscle is cut and exposed to the air the meat is mottled, in contradistinction to the grained appearance of healthy meat.

IV.—*Appearances due to Chronic Wasting Diseases.*

In cases of long-standing diseases, where the animal is debilitated, where the heart is feeble and the circulation consequently inactive, a condition of dropsy often sets in. In such cases the blood is more watery than usual, and the serum of the blood finds its way from the vessels into the tissues. Meat in this state is pale in color, flabby, and wet. It does not "set" or become firm upon hanging as healthy meat does. In scientific language, *rigor mortis* does not take place. Such meat will "pit" or leave the mark of the finger on pressure, and has not the elasticity of healthy flesh.

It is important to know this class of meat, as in diseases which in themselves are harmless to man, when the animal has reached such a low condition as to present the above appearances after death the flesh is certainly harmful, such meat being often called by the trade "diarrhœa meat."

V.—*Points in the Examination of Meat for the Detection of Special Diseases.*

Apart from the appearances already noticed, an animal may be unfit for food through the presence of some specific disease. As Walley happily puts it: "The more certainly it can be shown that any particular disease from which an animal has suffered is capable of being transferred from animals to man, or by ingestion from animal to animal, the less hesitation should there be in condemning its flesh for the purposes of human food."

I will only touch lightly upon a few of the most important diseases common in our country, and endeavor to give a few hints to aid in their recognition.

Many of the lower animals are subject to parasitic disease, one of the most common being the *cysticercus bovis* of the ox, sometimes called measles. These worms form little bladders in the substance of the muscles of the animal about the size of a small pea, filled with an albuminous material. They are principally seen in the muscles of the neck and shoulder or under the tongue. This flesh, when eaten, is apt to cause the tape-worm in man, giving us another example of the change from animal to animal being necessary for the cycle of existence in many of the lower forms of life.

Perhaps the most important disease in connection with cattle is tuberculosis, or, in common language, consumption. Of late years the intimate connection between this disease in man and in the lower animals has been abundantly proved. That the disease is identical in both is now beyond doubt, and modern opinion and experiment are demonstrating more strongly day by day the danger in using the flesh of tuberculous animals. Walley, in his "Meat Inspection," quotes the case of a girl who became consumptive through eating the flesh of imperfectly cooked tuberculous fowls. In the same work a chart is referred to, published in the Grand Duchy of Baden in 1881, referring to 52 towns, and shows that "when tuberculosis is prevalent among cattle it is equally prevalent amongst the human population, and is particularly prevalent in those towns in which the number of low-class butchers is greatest."

When inspecting meat, always look to the lining of the ribs, experts call it the pleura; should it be "stripped" or skinned off, and not present a smooth, even, shiny surface, look carefully at the meat. If it shows any of the characters I have mentioned in speaking of diseased meat, condemn it at once. Should the meat appear healthy, still look further, search for the lymphatic glands, what butchers call "kernels," you will find them deep in the neck, in the groin, in front of the chest; the butcher will show them to you, an amateur could hardly find them; should they be large, soft and cheesy, you will not make a bad mistake in destroying the meat.

Through the kindness of Mr. Robertson, Superintendent of the City Abattoirs, I am able to show you an excellent specimen of tubercle, in what was purchased as a prime bullock. You will notice that the meat is fat and well nourished, yet the pleura is covered with tubercle. Half of the pleura is stripped, to show the method adopted to conceal traces of disease.

There are many other diseases in cattle, rendering them unfit for food—small-pox, anthrax, foot and mouth disease, pleuro-pneumonia, etc.—which it is outside the province of this paper to touch upon. I may say, however, that the ribs may be stripped in pleuro, and the flesh perfectly eatable, unless it shows signs of fever or emaciation.

Fluke here is very common on moist pastures, and should be looked for in the liver, the veins of which are seen to be enlarged, and on cutting into them the flounder-like animals come out. If the meat is in good condition and "sets" well, it is perfectly wholesome.

Actinomycosis, lumpy jaw, or monkey tongue is common, and has lately been discovered in man. Should the animal affected be seen alive, and show swellings about the jaw and tongue, or abscesses in the side, great care should be taken in its use; but as only dressed carcasses are likely to come under your eye I think I can neglect this subject.

Method of Slaughter.—Though not strictly connected with meat inspection, the method of slaughter is of interest to the military officer, and has, as far as I know, been completely ignored. In Victoria we adopt the method known as "pithing," *i.e.*, the animal is speared in the nape of the neck, the spear dividing the spinal cord and thus paralyzing all the parts in the rear; the throat is then cut and the carcass bled. In such a proceeding the nervous mechanism which regulates the tension in the blood vessels is destroyed, the result being that the animal bleeds imperfectly, a large quantity of blood being left in the hindquarters; on the other hand, in the "Jewish" method, or that in which the throat is rapidly cut without previous stunning, this nerve mechanism is not interfered with, the vessels retain their contractile power and convulsions take place, which still further help to squeeze all the blood from the body. You will naturally ask, why should the blood be so carefully removed? The answer is, the more carefully the blood is removed the better the keeping power of the meat. Dr. Dembo, of St. Petersburg, who has written on the subject, has demonstrated by actual experiment that meat killed in the Jewish way will keep even in summer one or two days longer than that killed by the usual methods.

But, perhaps, the most striking aspect of the case is from the financial point of view. Dr. Dembo proves beyond all reasonable doubt that an army of half a million men loses £25,000 a year when using meat killed as we kill it, by paying for useless blood. These are two points worthy of the attention of military men, and I would refer any one interested to "The Jewish Method of Slaughter," by Dembo, which has already been translated into English and German.

Salted and Canned Meats.—Little need be said about these. In salt meat the same signs of disease hold good as in fresh. All salt meat should be probed to the centre with a knife or skewer, as putrefaction commences close to the bone.

With regard to canned meats, always see that the head of the tin is concave; should it be convex, it is an evidence of decomposition having set in. Among the trade, the term "blown" is given to these tins, and, as you will see by the sample I am showing you, there is little difficulty in detecting improper material of this class. What I have said holds good with regard to tinned vegetables also.

Bacon is often used by troops on service. The rind should be thin, the fat white, and the flesh bright-colored on section. A knife should always be passed into the thicker portions down to the bone, to test for putrefaction.

Before leaving the subject of meat, may I make a suggestion—a properly trained veterinary surgeon should be attached to each division of the commissariat corps, whose duty it should be to inspect the cattle before slaughter, if possible, and also after; such a step I believe has recently been taken in the French army, and we might in our small way give an example in what can only be productive of good.

BREAD AND FLOUR.

Bread is often not given the place it deserves as a disease producing agent; yet acid bread, made from old flour, does cause diarrhoea. The inspection of bread is simple—there should be about 30 per cent. crust, according to Parkes, it should be well baked, the crumb porous, and riddled with small cavities, no part should be solid; should the color be yellowish suspect that the bread has been made with old flour, in which case it will have an acid taste when held in the mouth. Do not mistake the brown color of bran or other grains for changes due to bad flour, yeast, or bad baking. Potatoes are sometimes used in making bread, but, beyond making it heavy and sodden, they are not injurious. Perfectly good materials may be used, and yet if the bread is hastily made it may be unfit for food. Bread before being baked should be allowed to "prove," *i. e.*, should be allowed to rise or expand, under the action of the yeast, before being put into the oven. If this is not done it will be close in texture and heavy and unwholesome.

I think that, instead of the ordinary white bread supplied to our troops in camp, whole meal or brown bread would be more suitable; it has a higher nutritive value, and is certainly quite as palatable.

Flour should be white in color (if markedly yellow it is old), sweet to the

smell, any lumps should break down easily, when taken in the hand it should form a ball, if thrown against the wall a portion should adhere. The taste should not be sour, and when made into dough it should pull out into long strings. I have touched upon flour because, giving it good, a soldier, especially an Australian, should be able to make his damper and be independent of the army baker.

This concludes my paper. It is necessarily very imperfect, and does not pretend to deal with food analysis in any way. My sole object was to give a young company officer a few hints as to what to look for in regulation food. My remarks are not made for the commissariat officer, who is an expert, but simply for use upon emergencies such as occur daily in the field. If I have, in the foregoing remarks, made one of you realize the importance of healthy food to the soldier, and the extent to which food is adulterated, I will feel that my work has not been in vain. I can assure you that the greatest difficulty I have encountered has been in procuring healthy or sound specimens.

DISCUSSION.

DOCTOR HENRY.—I do not know whether you expect me to open the discussion. I came here at the invitation of Captain Miller to hear his paper on the inspection of food. I hardly hoped, when I came here, to hear such a comprehensive paper on the classes of food, particularly on that class of food which soldiers require on the field. Although never engaged in active warfare, although by my appearance here to night you might think I had, I was present as a non-combatant in the greater part of the war in '70 and '71, as well as seeing a little of the fighting of '64 and '66 in Germany. In the latter period of '71 I had particular opportunities for observing the particular care in the selection of the food for the German soldiers. I was not in those days sufficiently familiar, or expert, or interested in the different modes that they followed in carrying out the particular measures which they adopted, because I was there in my first year of medical study, but it was noticeable to me that they were extremely careful in the selection of their meat, and also the care which they exhibited in purchasing the so-called "compact food" necessary for carriage in so large an army. You are all familiar with the method of concentration adopted in the German army for the different foods—"sausage meat," which helps them in times of difficulty. I notice here a large number of veterinary surgeons who will say something on that part, therefore I will confine my remarks to the supply of the class of food suitable for an army in the field. There is no doubt that there must be a distinction made between the British soldier and the soldier of other armies. Their tastes are different, and their customs are different, and their methods of bivouacking may also be considered somewhat to differ. The French and German soldier does not partake of tea, for instance. It is regarded in Germany almost as a medicine, and when you go into ordinary society in those parts, and you hear of any one drinking tea, you immediately ask—"What is he suffering from?" The usual beverage is coffee. The German soldier drinks his coffee cold. Captain

Miller will tell you that there is nothing quenches thirst so readily as coffee. It is possible that the discipline which exists among soldiers of other nationalities is a good deal stricter, but the British soldier is very particular with regard to the food he takes. It has been said that the battles of England have been fought on the beef of England. This class of food has not been given to soldiers of other nationalities. These prejudices have to be overcome—the soldier has to be educated largely to the fact that a certain class of food, for instance the frozen meat of Australia, is nutritious, and there is nothing detrimental in taking it. There is one point that struck me during the reading of the paper; that is, that in the text-books which I as a medical man have to look at, though it may not belong to the practical part of my profession, there are certain classes of food to be avoided. I do not mean diseased food, but perfectly healthy food. When you train an animal, for instance—a race-horse or plough-horse—it is understood by the trainers that a certain class of food must be administered, so as to get the greatest amount of good out of him. So it is with athletes; you give an athlete the best class of food to bring out in him the best results. It is intended in the army to provide the military with a class of food which will in the time of engagement in the field produce from the man the best results. I do not know that in any of the works upon military commissariat much is said on this particular point. If you allow the military during active engagement to eat any kind of food—I am speaking of healthy food at the present—that would be a great mistake. Supposing you have an engagement shortly, and you allow the men to indulge in farinaceous and saccharine food, you will get very disastrous results. I am not aware that it has been practically demonstrated, but it is my impression that it would lead to bad results. If you give a diet of potatoes, sugar and rice you will get a condition of fermentation within the individual which would lead to what is called alcoholic fermentation. It produces a lethargic ineptitude and enervation. It would be disastrous if you allowed troops under your charge to indulge when the greatest effort is expected of them. It would almost incapacitate them from showing the greatest fitness in the engagement. Some American troops, I believe, have taken notice of this, and previous to an engagement they are largely fed upon purely animal diet, with a total exclusion of the food I mentioned, which would possibly bring on a loss of power. I think this is a matter of sufficient importance to receive consideration in the distribution of food for the army. I do not think I can add anything more, but I would like to say that I have greatly admired and I compliment Captain Miller on the excellent way in which he has given to you this evening such a good object lesson on the facts with which he is so familiar.

NOTES ON THE BICYCLISTS AT THE FRENCH
GRAND MANŒUVRES, 1895.

(From The Army and Navy Gazette.)

A FRENCHMAN seems to take to bicycling as readily as a duck does to water, so it is not surprising that for some time past bicyclists have played quite an important part in the French army. Until the present year, however, they had only been used as orderlies for carrying orders, keeping up communication between bodies of troops, etc., but at this year's grand manœuvres a small party of twenty-five men was organized as a separate body for reconnoitring purposes. A few details as regards the organization and work of this detachment may perhaps be of interest. In the first place it must be clearly understood that this was entirely in the nature of an experiment, and the team quite a scratch one, with no previous experience to guide them. The subaltern in charge, a lieutenant in the 1st Battalion of Chasseurs-à-Pied, shortly before the manœuvres commenced, asked and obtained permission to form a bicycle detachment. As soon as he had obtained the necessary authorization he proceeded to pick up, to use a sporting phrase, his team. He selected from amongst the different regiments of the 6th Corps men known to be good cyclists, and who were either "marksmen" or "first class" shots; the only other qualification, and this a most important one, being that each man should be able to read with ease the French Staff maps (those used at the manœuvres were on a scale of about one-and-a-quarter miles to an inch, R.F. 1-80,000th). To assist him in the command of the detachment he had with him one sergeant from his own battalion and a corporal. The men were at liberty to use either their own or government machines, and, as far as could be ascertained, the majority brought their own bicycles with them. They were armed with the cavalry carbine, a beautiful little weapon, which they carried slung across their backs, as none of their machines were adapted for carrying arms. The French War Department, however, is at present manufacturing some bicycles adapted in every way for military purposes, and I understand that next year a company of bicyclists one hundred strong will take part in the manœuvres. The men carried the cartridges *en banderole*; no side-arms were worn as the French carbine is not fitted for a bayonet. The lieutenant carried his sword strapped to the horizontal bar beneath the saddle. The party was attached to the 6th Army Corps, and as a rule, took their orders direct from headquarters, being always billeted in the same village as the general and his staff.

As far as regards the reconnoitring, General Hervé, commanding the 6th Corps, was extremely satisfied with their performances, and they appear to have afforded him much valuable information as to the enemy's position and movements. The distances covered were certainly far greater than cavalry could have managed without undue exertion both on the part of men and horses. On September 9, the day before the battle between the

two armies at Parnod, many of these bicyclists covered as much as eighty miles; and one of their number, sent back late in the day with a message for headquarters, did the distance—sixteen miles—in fifty minutes; this over hilly roads covered in dust under a burning sun. It was on the evening of this day that I made the acquaintance of several men of the detachment at the village inn of Damblain, and when their supper was served one of their number, with true French politeness, invited me to join their mess, an offer under the circumstances too good to be refused.

Many amusing stories came out in the course of conversation. One man had concealed his message in the pump of his bicycle; another pursued by cavalry, had hidden himself in a mill and hauled his bicycle up with him to the second floor; another, interrogated by one of the enemy's officers, and asked where he was going, had played the part of injured innocence and pretended that he was going to see a sick comrade in a neighboring village. Cavalry had often tried to pursue them, but never with the slightest success. Lying down under cover of the crests of hills they would pour in stinging volleys, and as soon as the cavalry approached they would mount and be a mile away by the time the horsemen appeared over the crest. They seemed none the worse for the day's work, and though, naturally enough, very tired and quite ready to turn in when "lights out" was sounded, were with few exceptions as merry as crickets. The place being crammed with troops, a bed was out of the question, so I got a rug from the landlady of the inn and spread it on some hay in a barn close by; my field glasses under the rug made a very passable pillow, even better than the sword-hilt recommended *ad hoc* by Lord Wolseley in his famous "Soldiers' Pocket Book." One of the men promised to wake me, so next morning I started off with the detachment at 3 A.M., Lieutenant Saumade, the officer in charge, having very kindly given me permission to accompany them. What their exact orders were I do not know, but I gathered from their movements that their instructions were to gain touch of the enemy's cavalry, to keep in contact with them, and to send early information of any attempt at a turning movement. An infantry regiment was wending its way out of the village as we left, but in the grey moonlight of a misty morning it was too dark to make out their regimental number. We soon passed them, and then I guessed by the bearing of that good friend the pole star that we were making towards Fresnoy, on the left of the army—6th Corps and 6th "bis." As is customary at all field manoeuvres in the French army, words of command were very sparingly used, a whistle carried by the lieutenant doing all that was necessary, "mount," "dismount," "halt," etc., being signified simply by a short blast on the whistle.

As regards the formation adopted on the march (should I say "on the bicycle"?) no particular distances were kept. The lieutenant in charge led the way followed by his little flock of twenty-five in the order most convenient to themselves, that is to say, two or sometimes three abreast, and when on level ground at a distance of two or three yards one from the other. In going up hill, when obliged to dismount, the column, of course, very often closed up to much closer distances, but when remounting the lack of previous drill was very apparent, and as everybody as a rule took his own

time about it, there was often a good deal of straggling for a while. In this connection I should like to draw attention to a most interesting article devoted to military cycling in the September number of the JOURNAL OF THE MILITARY SERVICE INSTITUTION (U. S. A.) by Lieut. R. G. Hill, 20th U. S. Infantry. The author deals very fully with the space occupied on the line of march by bodies of cyclists acting as mounted infantry, and gives estimates for a body of 6000 men. It would be very useful if a large party of cyclists could be got together in this way as an experiment. Even if only 500 or 1000 men were assembled it would give us a great deal of practical experience on which to base some calculations for larger bodies, experience which at present we do not possess. To return to details of the ride on September 10. After passing through Fresnoy about four and a half miles from Damblain, from which place a cyclist was sent back to headquarters (presumably to give information that no enemy had yet been seen), the majority of the party bore to the left through the Bois de Fresnoy. Shortly after entering the wood some cavalry were observed coming down the road towards us, so, on the usual signal from the lieutenant, the men jumped off their machines and popped into the wood by the side of the road. As soon as the horsemen, dragoons, got opposite our ambush the party "let fly" at them, causing no end of commotion amongst the horses and some pretty strong language from the dragoons.

It turned out that they were part of an umpire's escort; but as we were on their left side and it was very dark in the wood, the lieutenant had not caught sight of their white bands, worn on the right arm by all the umpire staff. *Hinc illa lacryma.* Taking the first turning to the right we bore down the valley towards Larivière, about three and three-quarter miles from Fresnoy. On reaching the open about half-way down the hill we caught sight of some of the enemy's videttes posted above and south of Larivière on the hill marked 452. A bicyclist was immediately sent back with this information. There was some straggling down this hill, which was rather steep, a good deal of "go-as-you-please" being perhaps unavoidably allowed, some men walking their machines, others riding them down. Just as we approached the village, at a bend of the road we discovered a picket of the 19th Dragoons dismounted, so, putting their machines in the ditch by the roadside, the party formed up and favored the picket with two or three volleys at not more than 200 yards. The dragoons hastily turned out and replied to the fire. Fearing, however, that they might be charged, the party retired a little way off to a friendly farmhouse and got under shelter of the buildings and hedges, whilst some of the men constructed a barricade with logs, etc., across the road. Presently a small party of hussars, one officer and four men, was observed stealing out across the fields with the evident intention of cutting off the intruders, so, remounting, the cyclists quickly retired some way up the road to a spot where they were out of sight of the dragoons and made ready for the adventurous hussars. As soon as the hussars reached the road in our rear (that is to say, north of us) they formed line and charged down on us, but with fifteen carbines blazing away at them in real war not a man could have survived. It was after this incident that the lieutenant remarked to me that they certainly ought to have

the rifle and bayonet to defend themselves from cavalry attacks, and in this I think he was right. M. Saumade also informed me that he had been told specially to observe the movements of the 19th Dragoons, as on the day previous this regiment had been met with everywhere, and had been, indeed, quite ubiquitous.

As the bicyclists had orders to remain *in statu quo*, I shortly after this left them and hurried back to Fresnoy just in time to see some of the 40th Division (6th Corps) deploying at the entrance to the village for the attack of Parnod. I frequently came across the cyclists after this, but never followed their movements so closely as on this occasion. It certainly appears to me, from what I saw and heard, that for reconnoitring and scouting in country where good roads exist bicyclists are invaluable, and can easily hold their own against cavalry, even when considerably outnumbered. It seems a pity that they were not made use of with the outposts at night. I believe that a system of bicycle patrols along all the main roads in the vicinity of an army's position would do more than anything else to render that army free from night attacks and all enterprises of a similar nature. But on this occasion the party of bicyclists were hardly fulfilling their true rôle—that of mounted infantry—being used more as cavalry to penetrate the enemy's screen, whilst protecting their own troops from hostile enterprises, and during battles to watch the enemy's horse whilst protecting the flanks of their own army.

A French officer has lately invented a portable bicycle which can quickly be taken to pieces and carried, when necessary, in place of the knapsack on the men's backs. Thus on good roads the steed carries the rider, but if obliged to move across country, the rider carries the steed. When this invention has been thoroughly perfected we may look for important developments in the way of military cycling. Had Monmouth been accompanied by a party of bicyclists on that fateful night march to Sedgmoor these noiseless scouts would in all probability have informed him in good time of the ditches which lay in his path, and a Stuart king might now be reigning in England.

THE ADMINISTRATION OF THE WAR OFFICE.

(From The United Service Gazette.)

HER MAJESTY has been pleased by an Order in Council of November 21, 1895, to rule that it is expedient to define the duties of the principal officers who may hereafter from time to time, under the Secretary of State for War, be charged with the administration of departments of the army, subject to such regulations as may be made by the Secretary of State for War. Her Majesty in Council has been further pleased to direct that the Order in Council of February 21, 1888, defining the duties of Commander-in-chief and the Financial Secretary of the War Office, be revoked.

We have received from the War Office the following memorandum showing the duties of the various departments of the War Office, and the responsibility of its principal officers to the Secretary of State:—

The Secretary of State exercises administrative control over all army Services, and the heads of all the principal departments, both military and civil, are responsible to him for the discharge of the duties assigned to them.

He is assisted by the under-Secretaries of State.

A War Office Consultative Council, presided over by the Secretary of State, will meet when required for the discussion of such subjects as may be referred to it by the Secretary of State.

The Council will consist of the under-Secretaries of State, the Financial Secretary, the military heads of the principal Military Departments, and of such other officers as may on special occasions be summoned to attend its meetings.

PRINCIPAL MILITARY DEPARTMENTS.

Department of the Commander-in-chief.

The Commander-in-chief exercises general command over Her Majesty's military forces at home and abroad, issues army orders, and holds periodical inspections of the troops.

He is the principal adviser of the Secretary of State on all military questions, and is charged with the general supervision of the Military Departments of the War Office.

He is charged with the general distribution of the army at home and abroad; with the preparation and maintenance of detailed plans for the mobilization of the Regular and auxiliary forces; with the preparation of schemes of offensive and defensive operations, and with the collection and compilation of military information; and with selecting fit and proper persons for appointment to commissions in the Regular forces, and with proposing fit and proper officers, whether of the Regular or auxiliary forces, for promotion, for staff and other military appointments, and for military honors and rewards.

The Military Secretary deals with appointments, promotions, and retirement of officers of the Regular and auxiliary forces; with selections for appointment to the staff, etc.; with the grant of honors and rewards, etc.; and with regulations for the admission of candidates to the army.

The Director of Military Intelligence deals with the preparation of information relative to the military defense of the Empire and the strategical consideration of all schemes of defense; the collection and distribution of information relating to the military geography, resources, and armed forces of foreign countries, and of the British colonies and possessions; the compilation of maps, and the translation of foreign documents. He conducts correspondence with other departments of the state on defense questions, and is authorized to correspond semi-officially with them on all subjects connected with his duties.

The officer in charge of mobilization services deals with all questions connected with the mobilization of the forces, including field army establishments, and with the tactical examination of all schemes of defense.

The Adjutant-General's Department.

The Adjutant-General is charged with the discipline, military education

and training of the officers, warrant officers, non-commissioned officers, and men of the regular and reserved forces and militia of the United Kingdom, and of the Yeomanry and Volunteer force of the United Kingdom when subject to military law, or when assembled for training, exercise, inspection, or voluntary military duty, with patterns of clothing and necessaries, with the maintenance of returns and statistics connected with the personnel of the army, and with enlisting men for, and discharging men from, the Regular and auxiliary forces.

He will submit proposals for the establishments to be provided for in the annual estimates, and it will be his duty to advise the Secretary of State on all questions connected with the duties of his department. In the absence of the Commander-in-chief, he will act for him.

The Quartermaster-General's Department.

The Quartermaster-General is charged with supplying the army with food, forage, fuel and light, and quarters, with land and water transport, and with remounts; with the movement of troops, and with the distribution of their stores and equipment; with administering the Army Service Corps, the Pay Department, and the establishments employed on the above services; and with dealing with sanitary questions relating to the army.

He will make such inspections as may be necessary to secure the efficiency of the services under his control.

He will submit proposals for the annual estimates for the above services, and it will be his duty to advise the Secretary of State on all questions connected with the duties of his department.

Department of the Inspector-General of Fortifications.

The Inspector-General is charged with the construction and maintenance of fortifications, barracks, and store buildings, and the inspection of ordnance factory buildings, with military railways and telegraphs, with the custody of War Office lands and unoccupied buildings, with advising as to the design and issue of Royal Engineer and submarine mining stores. He will submit proposals for the annual estimates for Engineer services.

He will advise as to the general distribution of the corps, as to the appointment of officers to, or their removal from, responsible positions in connection with works; on all questions relating to the technical instruction of the Corps of Royal Engineers. He will make such inspections as may be necessary to secure the efficiency of the services under his control, and it will be his duty to advise the Secretary of State on all questions connected with the duties of his department.

Department of the Inspector-General of Ordnance.

The Inspector-General is charged with supplying the army with warlike stores and equipment; with the inspection of all stores supplied by the manufacturing departments or by contractors; with dealing with questions of armament, of patterns, of inventions, and designs, and with the direction of the Ordnance Committee. He will administer the Ordnance Store Department and the Ordnance store corps, and will make such inspections as may be necessary to secure the efficiency of the services under his control. He will

submit proposals for the annual estimates for the above services, and it will be his duty to advise the Secretary of State on all questions connected with the duties of his department.

OTHER MILITARY DEPARTMENTS.

Reporting to the Commander-in-chief, the Adjutant-General, or the Quartermaster-General, according to the nature of the matter submitted.

The Director-General of the Army Medical Department

is charged with the administration of the medical establishments of the army, with the medical staff corps, with the preparation of medical and sanitary statistical returns, and with the supply of medical stores to the army.

The Director-General of Military Education

is charged with the educational qualifications required from candidates for commissions in the army; with the education and examination of officers, non-commissioned officers, and men; with the administration of the Staff College, Artillery College, Royal Military College, and Royal Military Academy, and with the supervision of army schools, etc.

The Chaplain-General

is charged with the supervision of the chaplains of the Church of England, and with all questions connected with Church of England services.*

The Director-General of the Army Veterinary Department

is charged with the administration of the veterinary establishments and services of the army and with the preparation of sanitary and statistical returns relating to the above services.

FINANCIAL DEPARTMENT.

The Financial Secretary is charged with financially reviewing the expenditure proposed to be provided in the annual estimates for army services, and with compiling those estimates for submission to Parliament;

With financially reviewing any proposals for new expenditure, or for any proposed redistribution of the sums allotted to the different sub-heads of the votes for army services;

With seeing that accounts of all expenditure of cash and stores are correctly and punctually rendered; with auditing and allowing all such expenditure, and recording the same under its proper head of service in the annual account for Parliament; with issuing all warrants for the payments of moneys; with making all imprests to accountants and others;

With the control of the manufacturing departments of the army (including the clothing department), and with controlling and recording all contracts for army services; and with advising the Secretary of State on all questions of army expenditure.

The Accountant-General

is charged, as permanent head of the Finance Division, with advising the Financial Secretary on all financial questions; with compiling the esti-

* Arrangements as to other denominations are made by the Permanent Under-Secretary of State.

mates for submission to Parliament; with issuing money for all army services; with the audit of all military expenditure of money and stores; and with the preparation of the annual account for Parliament.

The Director of Contracts

is charged with the supervision, in concert with the heads of the divisions concerned, of all contracts for transport; with the purchase or sale of supplies, stores, clothing, lands, and buildings; and with the supervision of all special local purchases. He will report the cost of production of stores in the Manufacturing Departments, in comparison with the rates at which similar stores could be purchased from the trade.

MANUFACTURING DEPARTMENTS.

The Director-General of Ordnance Factories

is charged with the administration and working, so far as possible upon a commercial basis, of the Ordnance Factories at Woolwich, Enfield, Waltham, and Birmingham. He will submit estimates of the expense necessary to carry out the orders he may receive for Army, Navy, India, and Colonial services; and will prepare the accounts of expenditure incurred in the factories for audit in the Finance Division and submission to Parliament. He will make an annual report to the Secretary of State through the Financial Secretary.

The Director of Clothing

is charged with the provision of clothing and necessaries for the army and with the administration of the Army Clothing Department at Pimlico.

DETAILS OF OFFICE PROCEDURE.

1. The head of each principal military department will be responsible for questions belonging to his department, and for submitting them (when higher authority is necessary) to the Secretary of State in a complete form, showing fully all the considerations involved.
2. When the question affects more than one of the military departments, the head of the department dealing with it will refer the papers to the other department, or departments, concerned, in order that the question may be considered in all its bearings before submission to the Secretary of State.
3. All important questions will be referred to the Commander-in-chief before submission to the Secretary of State. Questions which do not require the Secretary of State's decision, but which affect more than one of the military departments, will be referred to the Commander-in-chief for decision.
4. The principal military departments have power to authorize, without previous reference to the Financial Department, all expenditure covered by regulation and provided for in the sub-heads of the estimates. All papers authorizing charges in army accounts will be marked to the Financial Department for notation by the auditors.
5. Proposals by the principal military departments for new expenditure, for expenditure not provided for by regulation, and in the sub-heads of the estimates, for changes in authorized establishments, for new patterns, for

alteration in existing patterns, or for changes in the quality of supplies or stores, or in the extent of authorized reserves, will be referred to the branch of the Financial Department which deals with the subject for report. The Financial Department will return the papers, when reported upon, to the Military Department, and the head of the Military Department concerned will obtain the decision of the Secretary of State, if there should be a difference of opinion between him and the Financial Department.

6. All questions that have to be submitted to the Treasury will be referred to the Financial Department, and all letters to the Treasury will be signed by the Financial Secretary after the drafts have been approved by him, the record of the correspondence remaining in the Military Department.

7. Correspondence arising out of the examination of army accounts, and all questions of the interpretation of regulations relating to pay and allowances, will be dealt with by the Financial Department in communication, where necessary, with the Military Department.

8. Appeals, by officers and others, against decisions given in the Financial Department will be referred to the Military Department for remarks. Where the Military and Financial departments differ in opinion on such questions, the latter will submit the papers for the decision of the Secretary of State.

9. All questions requiring the decision of the Secretary of State will be submitted through the permanent under-Secretary of State.

The Army Board.

10. The Commander-in-chief, the Adjutant-General, the Quartermaster-General, the Inspector-General of Fortifications, and the Inspector-General of Ordnance, or such of them as may be summoned, will form a Board, under the presidency of the Commander-in-chief, for the purpose of reporting upon—

(a) Selections for promotion in the army above the substantive rank of major;

(b) Selections for Staff appointments above the rank of lieutenant-colonel;

(c) Proposals for estimates, see paragraph 16; and such other questions as may be referred to it by the Secretary of State.

11. The Accountant-General will attend the Board and give it such financial information as may be necessary, but the presence of the Accountant-General at the Board does not dispense with the necessity for submitting formally to the Financial Department all questions requiring financial considerations; see paragraph 5.

12. Additional officers may, when necessary, be summoned by the President to attend the Board.

13. After a question has been considered by the Board, it will then be the duty of the head of the department concerned to complete the case, submitting it, when necessary, for the decision of the Secretary of State; see paragraph 3.

14. The Secretary to the Board will keep full records of its proceedings,

showing the questions discussed and the decisions arrived at in each case. Any member who dissents from the decision of the majority will record his dissent in the proceedings of the Board.

15. The record of proceedings of the Board will be submitted by the secretary for the information of the Secretary of State.

Estimates.

16. Before the detailed preparation of the Estimates is commenced the Secretary of State, having before him the proposals made by the heads of the military departments for new or increased expenditure, will give the Army Board information as to the approximate amount within which the army estimates for the year are to be kept. He will then refer to the Board such of the proposals as he may desire them to report upon. The Accountant-General will supply the Board with any calculations or information as to the cost of the proposals before them.

17. The Board will then proceed to consider, and in their report they will indicate, the relative importance to army requirements of the various proposals and they will state which proposals they recommend for insertion in the estimates of the year.

It will also be the duty of the Board to consider and to state in their report what economies are practicable in existing expenditure on military services.

18. When the Secretary of State has decided upon the proposals for establishments and other services for the ensuing year, his decision will form the basis upon which the preparation of the detailed votes and appendices will be proceeded with.

Vote 6. Transport and Remounts,	} will be prepared in detail by the military departments concerned.
Vote 7. Provisions, etc.,	
Vote 9. Stores,	
Vote 10. Works,	

19. The other votes will be prepared and completed by the Financial Department, which will also finally incorporate all the votes, complete the army estimates, and submit them to the secretary of State.

Contracts.

20. The head of each military department will initiate all demands for services under his charge which require contracts to be entered into at headquarters, and tenders for such services will only be invited upon his requisition. Upon the tenders being referred to him by the Director of Contracts, he will state what tenders should, in his opinion, be accepted. The lowest tender will not be passed over unless the head of the department concurs with the Director of Contracts in doing so. In that case, unless such a course is governed by approved precedent, the authority of the Financial Secretary will be obtained, to whom also will be referred any differences of opinion between heads of departments and the Director of Contracts as to the tender to be accepted.

Any points, other than those of mere detail, which arise upon the review by the Director of Contracts of local contracts, concluded in home and for-

eign commands, or of local purchases, will be considered and reported upon by the head of the department to which the service belongs.

21. When differences with contractors cannot be locally settled, and an appeal is made by a contractor to the War Office, the Director of Contracts will refer the papers, with his remarks, for the opinion of the head of the department concerned. The latter, when necessary, will obtain such information as may be required from the officer responsible for the execution of the contract, and will then return the papers, with his opinion, to the Director of Contracts for disposal. When differences of opinion arise between the Director of Contracts and heads of departments the matter will be submitted for the decision of the Financial Secretary, and, when necessary, of the Secretary of State.

Army Orders.

22. Army orders will be drafted in the department dealing with the subject-matter of the order, and will be initialed by the head of the department as a guarantee of the necessity for, and the correctness of, the proposed order.

23. When orders and regulations affect more than one of the departments of the office it will be the duty of the Army Regulation Branch to circulate the draft to every branch concerned.

24. All orders and regulations will be referred by the Army Regulation Branch for the consideration of the Commander-in-chief before being submitted for the approval of the Secretary of State. When approved, they will be signed by the Commander-in-chief.

Correspondence.

25. All letters from the War Office will be written in the name of the Secretary of State for War, and, with the exceptions contained in paragraph 26, will be signed by the head of the department dealing with the question, or by an officer authorized to sign for him.

26. Letters addressed to other public departments (except to the Treasury, see paragraph 6), to members of Parliament, to municipal or other public bodies, will be signed by an under-Secretary of State.

27. Records of correspondence will be kept in the departments dealing with the subject-matter of the letters.

28. All letters to the War Office, and all returns, reports, etc., will be addressed to the Under-Secretary of State, and will be distributed by the Registry to the various departments concerned.

THE ROYAL ARTILLERY.

(From the United Service Magazine, London.)

THERE is no subject which needs more the attention of those who are about to apply themselves to the reorganization of the army than that of the Royal Artillery, which, although it consists of over 36,000 officers and men, is regarded and administered as a single regiment. The result has naturally been that no satisfactory system for the management of this colossal mass has yet been devised, and never will be till the dictates of common sense are listened to, and it is divided, first into branches, mounted and dismounted, and then into regiments of rational dimensions.

It has lately been remarked that the Woolwich scientists have been perpetually changing the armament of the field artillery, and that they are as far as ever from discovering the ideal field-gun, which appears to lie at the bottom of a well as deep as the one in which truth is concealed.

It is, however, by no means in their armament only that the Artillery have rung the changes; in nomenclature they have revelled in alterations; companies have become batteries, and batteries companies, for no earthly reason except to suit the taste of the authorities for the time being. Such changes, if unnecessary, and perhaps rather unmeaning, are at all events innocuous. It is, however, a very different thing when experiment after experiment is tried, affecting the organization of a body as large as a strong *corps d'armée*. In consequence of the principle of unity as a regiment being rigidly adhered to, naturally, only worse chaos and confusion have ensued from these successive attempts to tinker at the impossible, and most certainly chaos steadily increasing with each change has been the inevitable result.

Up to 1859, the artillery, with the exception of the horse artillery, was formed into battalions and companies. In that year the first important modification was made. A horse brigade was formed of the horse artillery troops, which from that time were termed batteries, while six field and eight garrison artillery brigades were constructed, with a large depot and a coast brigade, the latter being under officers from the ranks. In 1861-62 the Bengal, Madras and Bombay Artillery were amalgamated with the Royal Artillery, which necessitated a reorganization, the result of which was the formation of six horse, ten field, and fifteen garrison brigades, with large depots at Woolwich, Sheerness and Warley.

This system worked so well, and the Indian requirements were so satisfactorily met by the depots, that it actually lasted without fundamental change for nearly sixteen years. The brigades were certainly not left entirely in peace; at times they were decreased in number and increased in dimensions, at times the converse was the case, but the brigade system, under which bodies possessing cohesion and all the machinery of a separate regiment, into which they could have been converted with comparatively little difficulty, was, up to 1877, preserved. *No thoroughly satisfactory organization of a huge body like the artillery, in a single regiment, could under any*

circumstances be arrived at, but none has come so near to answering the requirements of intelligible and possible administration as this brigade system of Colonel Charles Bingham. Considerable Esprit de Corps existed, and both officers and men were proud of belonging to the A Brigade, the 4th or 9th Brigade, etc.

In an evil hour, in 1887, it was determined to change all this, and as a step towards destroying the brigade system, the horse artillery was massed into three large brigades, and the field and garrison into six each; the large depots were broken up, and one of moderate size was allotted to each brigade.

In 1882 the horse artillery was further massed into two very large brigades, and the field artillery into four. The batteries were grouped into tactical units of two or three under a lieutenant-colonel; the one single lucid arrangement so far devised! Field artillery depots were abolished. The garrison artillery was divided into eleven territorial divisions, each with a depot.

In 1884, the abolished field artillery depots were reformed, as the experiment of furnishing the necessary drafts for India completely broke down for want of them.

In 1889 the last trace of the brigade system disappeared; the whole of the horse artillery batteries were lettered, and the field batteries numbered consecutively. The garrison artillery, which had been territorialized in 1882, was unterritorialized now, and was massed into three large so-called administrative groups or divisions, with headquarters at Dover, Portsmouth, and Plymouth.

In 1891 garrison batteries were called companies, as they had been up to 1859. Double companies were formed, and specialists were created. A writer on cavalry training in the *Times* lately, most wisely deprecated this specialist system; though in the cavalry the abuses of it are nothing to what they are in the artillery, in which corps specialists of every description swarm, and form a real old man of the sea. With the exception of a moderate number of officers and non-commissioned officers sent from time to time to instructional establishments to qualify as teachers, no men should be taken from their units, and no courses of instruction should be formed, except locally and under the direction of commanding officers. In a word, as is so insisted on in the German army, all instruction should be imparted to the men by their own officers. The term specialist should disappear, and with its disappearance the officers would take more interest in their work, and the men would be taught only that which is of use to them. The country would be saved an enormous amount of expense, and commanding officers the real grievance of the perpetual drain on their units, caused by withdrawing from them large numbers of men to go through courses of instruction at Woolwich and elsewhere.

In 1894 the double companies formed in 1891 were broken up, and the garrison artillery reverted to the 1889 system, with the exception of the retention of the term company.

In 1895 the horse and field artillery depots were partially reduced, and one horse and seven new field batteries were created from the débris, while

the garrison artillery lost three depots and gained six companies. Service batteries on the lower establishment, and garrison companies, are now, in consequence of the reduction of the depots, required to furnish drafts to fill vacancies abroad, a system which has met with the almost universal disapproval of artillery officers. It is considered that a line battalion may contribute annually a fifth of its strength to its Siamese battalion abroad, and it was apparently thought that the same process might be applied with success to the artillery. It was overlooked that while a comparatively large body like an infantry battalion might spare that proportion of its strength without seriously affecting it, small units like batteries and companies would by no means be in a like position. A horse artillery battery on the lower establishment consists of 152 non-commissioned officers and men, it has to furnish 44, or over one-fourth of its strength yearly for drafts for India; in the same way, a field battery on the lower establishment of 135 non-commissioned officers and men must produce drafts of 28, and a garrison company of the average strength of 125 non-commissioned officers and men has to give 30 gunners.

The officer commanding a battery or company of artillery is a very hard worked man, and his responsibilities are great; his reputation depends on the smartness of his command, and its success in shooting. He is, too, a paymaster with considerable money charge. His duties were quite arduous enough before he was saddled with the additional task of training recruits for units on foreign service. Why was this change made, why was not well left alone? The answer is found in a speech of Sir H. Campbell Bannerman on the estimates in the House of Commons last March. He said: "With regard to the question of the artillery, the proportion of that arm in the field army has for many years been behind the continental standard. In order to minimize that proportion it was proposed to increase the Royal Horse Artillery by one battery, and the field artillery by seven batteries. The result would be that on the war establishment, our proportion of guns would be raised from eighty-four to one hundred and two per army corps. This increase had been effected chiefly by administrative changes at a very small cost, and would involve no appreciable alteration of the total establishment, although it gave an actual increase of eight batteries. Various alterations had been effected in the organization of garrison artillery (including the establishment of six new companies, viz., three at home and three abroad)."

This establishment of six new companies was brought about by the destruction of three most useful depots, and the splitting up of three double companies into six, so that nothing was added to the effective strength of the garrison artillery.

With regard to the field artillery it was worse still; the depots which were re-established in 1884, because it was found that their abolition in 1882 was a serious mistake, were again destroyed, and as Sir H. Campbell Bannerman said, seven new field batteries made their appearance; but at the present time, many months later, not only these seven batteries but seven others have only four out of their six guns, and there are no reserve guns whatever in the Royal Arsenal; so that one-third of our field artillery at home is

one-third short of its equipment, and if war suddenly broke out there are no means of making it up. The ex War Secretary would no doubt throw the blame on his "technical advisers," as he did in the case of the deficiency of small-arm ammunition discovered by Mr. Broderick. It was however his duty to the country to ascertain what means existed for carrying out an increase, which his words clearly implied was a *fait accompli*.

Formerly the drafts for India were prepared at large depots at Woolwich, Sheerness, and for a time Warley, as before stated, and from these central places the men were sent in large batches to the ports of embarkation. Now some seventy-four service batteries and companies in all parts of the United Kingdom have to send their dribblets to be shipped for India and the colonies. It can well be imagined how the cost to the public is increased, and how infinitely correspondence and returns are multiplied by such a complex system, which was substituted for one which was simple and comparatively satisfactory.

Again, India is likely to suffer severely from this method of furnishing drafts. From the depots, practically all the men were sent abroad. Now it is most unlikely that officers commanding batteries will send their best men away; they are certainly prohibited from ridding themselves by this means of all their men of indifferent character; but as every officer knows, there are many men whose behavior is unexceptionable, but whose efficiency as soldiers is *nil*. Having regard to the very high standard of excellence to which a unit of artillery must be now-a-days kept up, it would be supposing more virtue than is possible in human nature, if the authorities imagine that all the well-conducted deadheads serving in the artillery at home will not find their way abroad, there to swell, but not to improve, the efficiency of the ranks.

The system is radically wrong: it was established in order to enable the late government to play a smart trick, by hoodwinking the public and the House of Commons, and pretending that the guns of our three army corps have really been increased in number without increase of cost, which as we have shown is not yet the case.

If, as is proposed, the artillery is broken up into regiments, each having its own headquarters and depot, the men of the latter will be trained, as they have been up to this year, by officers and non-commissioned officers, whose sole duty it will be to prepare their men as efficient soldiers for service abroad; these depots will be units of supply not for fighting, and a high pitch of perfection as a whole will not be required of them. Justice will be done to fighting units by relieving them of the extra task thrown on them by training recruits; and the requirements of India will be far better met from drafts from the depots than by fragments from service companies and batteries.

It is said that this method of furnishing drafts which is now in the artillery, is the same which works so well in the infantry. To begin with, it is very much of a moot point whether it does work so well, and whether it will not be found advisable in that branch also, to group the small depots into larger ones. Again, the duties of artillerymen, and especially of those of the garrison branch, are far more multifarious and complicated than

those of infantry, and require a far higher degree of training; so that it must be patent that the withdrawal of from a fourth to a fifth of the effective strength of small units, is a far greater strain on them, than the same process when applied to infantry battalions 800 strong, whose men are by no means so expensively or scientifically educated as gunners. The greatest absurdity and anomaly however which exists in the present organization of the artillery, is the interchanging of the officers *ad libitum* between the mounted and dismounted branches. The former is very much preferred by the officers themselves, and there is a long list of candidates for transfer to it of lieutenants, captains, and majors, who feel it a misfortune to be compelled to serve in the garrison artillery. This is hardly to be wondered at, one can only be surprised that a senseless system like the present should have been so long persisted in. Take the case of a major just promoted to that rank, he has served for twenty years or not much less in the horse and field artillery, he is an excellent officer, a good tactician, horse master, and fit to command a battery in war. He is promoted to a company in a fort armed with the latest means and appliances of fortress warfare, of which he is probably perfectly ignorant; he comes to command and instruct a body of men, every one of whom except the last joined recruits, knows far more of the business than he does. Could any arrangement be more utterly inept or further removed from the most ordinary dictates of common sense? In the days when there was comparatively little difference between field-guns and the heaviest fortress gun—the 68-pounder—a mounted officer on transfer to garrison artillery had very little to learn, while the smartness he brought into the garrison artillery was very beneficial to the latter; this has now however become such a highly scientific arm, that to do it justice requires a very high standard of professional knowledge in its officers; while in smartness it should yield to none.

Again, it must be considered that the chance of active service, the aim and ambition of all officers worth their salt, is infinitesimally small in the garrison artillery, which alone accounts for the distaste of officers for this branch; it can never engage in offensive warfare, and can only come into activity when danger menaces our shores. It compares in fact, in this particular, very disadvantageously with the rest of the army. Thus so long as most officers see before them the chance of leaving it for the field or horse artillery, their heart will not really be in their work, and the garrison artillery must suffer.

No one will deny that a machine which requires constant structural alterations and repairs can never be expected to last nor work properly. Similarly no system of administering a body of troops, composing nearly one-fifth of our regular army, can be considered satisfactory, when its necessities cause it to be the subject of disorganization, reorganization, and of experiments, which are made and unmade *ad infinitum*. Our artillery officers are second to none in the world, and the results of their knowledge, care and energy are the admiration of all foreign officers who visit us, from the German emperor down. No praise can be too high for them. But they are what they are in spite of, not on account of, the manner in which the corps has been administered the last twenty years and more.

This has not been the fault of individuals; every Deputy Adjutant-General of Artillery, has, since the brigade system was destroyed, found matters in a hopeless mess, and he has done his best to improve them. One principle was, however, accepted by one and all as sacred as the Gospel, and that was the unity as a regiment of the whole of the artillery, and this has effectually obstructed and prevented the success of all attempts which have been made to produce an ordinate coherent system, which would be workable, and at the same time intelligible to the rest of the army.

Having so far diagnosed the disease, it is time to suggest a remedy. There are now twenty-one batteries of horse artillery and a small depot. It is proposed that these form one regiment, and that they be divided into twenty service, and two depot batteries.

Half of the batteries would be in India, and half with the depots at home. The batteries would be grouped in brigade divisions, four of three, two of four batteries each, under the command of a lieutenant-colonel, while another officer of that rank, and senior to the above, would command at the regimental headquarters at Woolwich where the depot would be stationed. His duties would be to command the depot, to keep all the batteries of the regiment up to their establishment of men, to keep the records, and to receive and dispose of all men coming from abroad, for discharge or otherwise. He would also administer all the horse artillery reservists.

The remaining lieutenant-colonels would command and be inseparable from their brigade divisions, in the same way as is an officer commanding an infantry or cavalry regiment.

Reliefs abroad would be carried out so that the integrity of a brigade division was always preserved. There need be no difficulty about this, for formerly whole brigades of eight batteries were sent abroad or brought home in a year.

Under the present system, lieutenant-colonels are stationary, batteries are not, so that they are constantly transferred from one command to another, which is obviously unsound.

If it be considered that twenty batteries and their two depot batteries would form too large a regiment, they could be divided into two regiments of ten batteries and a depot each.

There are now eighty-seven field batteries, of which forty-three are at home, one temporarily in Egypt, and forty-three in India. It is proposed to divide these into seven regiments; the first having fifteen batteries, the remainder twelve each. Half the above would be at home, and half in India, while the odd battery in Egypt would be found by the first regiment, which would therefore have eight of its batteries abroad and seven in India. Each regiment should have a depot. The distribution would be as follows:

	At Home.	Egypt.	India.	Total.
1st regiment	7	1	7	15
2d "	6	..	6	12
3d "	6	..	6	12
4th "	6	..	6	12
5th "	6	..	6	12
6th "	6	..	6	12
7th "	6	..	6	12

As in the horse artillery regiments, the brigade division would consist of three or four batteries under a lieutenant-colonel, who would remain with his unit, which would be both administrative and tactical, throughout his period of command. Each regiment would therefore require four lieutenant-colonels to command the brigade divisions, and one to command at the headquarters of the regiment and the depot. Depot batteries should be reformed and horsed, with four guns, and they should have full station equipment. They could be very easily mobilized in case of urgent danger or necessity. This would give us forty-two guns more for field and six for horse artillery; though how long the ordnance factories would require, under the present system, to meet such a strain upon their powers of production, it is, judging from past experience, very hard to say. The seven depot batteries of field artillery should be at Woolwich, where the headquarters of all the regiments of this arm should be stationed.

In Germany only four guns of batteries of horse and field artillery are horsed on peace establishment, and when we consider how quickly they can be brought up to full strength on mobilization, there appears to be no reason why we could not do as well, especially having regard to the safety given us by our "watery frontier," while Germany has immensely long and vulnerable boundaries, liable to rapid and sudden attack. Naturally it is not pretended that it would not be preferable, if money were no object, to keep all our batteries, and indeed our whole army, up to war strength, but we are bound to consider the interests of the taxpayers, whose burdens Sir William Harcourt not long since described as having nearly reached the limits of toleration, and we must cut our coat according to our cloth. By this plan the horse and field artillery would be divided into regiments, one half of which would be at home and the other abroad.

The promotion of officers would be carried out by regiments, as also would be that of regimental staff sergeants or warrant officers, that of other non-commissioned officers would be by brigade divisions. The term brigade division being long and meaningless, it is suggested that the word "group" be substituted; this term is used in the French artillery.

The proper division of the garrison artillery presents much greater difficulties, as there are fifty-eight companies abroad and thirty-seven at home, and six depots. The garrison artillery should be formed into six regiments, with their headquarters and depot respectively at Portsmouth, Dover, Plymouth, Sheerness, Cork Harbor, and Pembroke Dock. The first regiment would have seven companies and its depot at Portsmouth, and ten companies abroad. The remaining five regiments would consist of six companies and a depot at home and eight abroad, the headquarters would be, No. 2 at Dover, 3 at Plymouth, 4 at Sheerness, 5 at Cork Harbor, 6 at Pembroke Dock.

As in the case of horse and field artillery each regiment would be under the command of a senior lieutenant-colonel, who would be at headquarters, and be responsible for the supply of drafts for the companies of his regiment abroad, and for keeping up the strength of those at home. The companies should be grouped under the command of lieutenant-colonels, as with the mounted branches, and they would be responsible for the arma-

ment of the works in the charge of their companies. It is suggested that it would be a very economical system, to make all units of garrison artillery stationary, and to relieve the officers and men periodically. This plan has no doubt the disadvantage of presenting the appearance of an attempt to establish local forces; but it is so in appearance rather than in reality; for all the personnel would be regularly relieved, after a certain number of years' service, the terms of foreign and home service would be very fairly equalized, and it would only be an expansion of the present system of reliefs of non-commissioned officers and men.

The mountain artillery consists of nine batteries abroad and one at home, which acts both as a service battery and a depot for supplying all the batteries abroad; it is not in the mobilization scheme, and is not required for purposes of home defense. It should be regarded simply as a depot, and the headquarters of the mountain artillery regiment, and be commanded by a lieutenant-colonel. The mountain artillery is a special service, its stations are as a rule very good, and its chances of active service far greater than those of the rest of the artillery; it is therefore considered that its units need not be relieved and brought home, and that occasional service for periods of two years at the depot would be sufficient for officers who adopted this branch.

The artillery would thus be divided into one or two regiments of horse, seven of field, six of garrison, and one of mountain artillery, each having its depot.

There should be an Inspector-General of horse and field artillery, who would also inspect the mountain artillery, headquarters, and depot; and there should be an Inspector-General of garrison artillery. There should be, as now, colonels of artillery on the staff of general officers commanding large army districts; they should functionate as brigadiers and inspectors of artillery within their districts. The auxiliary artillery should be affiliated to one or other of the garrison artillery regiments; and they should be under the immediate command of a lieutenant-colonel, on the staff of the general commanding the army district in which they are located. In the northeastern and northwestern districts, in which there are a large proportion of volunteer artillery corps, including many position batteries, it seems advisable to appoint two lieutenant-colonels.

This scheme is merely put forward as a suggestion of a means for solving the problem of bringing about a practical and advantageous division of the huge overgrown heterogeneous body of the Royal Artillery. It is written more to incite discussion upon a subject, which must shortly be brought into the domain of reality and completion.

There is no ponderous mass like the Royal Artillery in any army of the world: it has grown to its present huge unwieldy size through the amalgamation of the three Indian artilleries, and on account of the necessity for increasing the artillery of the army. As before said, the mischievous and foolish principle of preserving its unity has caused the present most unsatisfactory state of things, and has given rise to the constant attempts at tinkering and repairing which have always had the same effect as that of mending worn-out garments with new cloth.

There is but one sound and safe course, and that is first to divide the branches of the mounted and dismounted artillery into different bodies, and subsequently to further subdivide them into regiments, to be called 1st, 2d, and 3d, and so on regiments of horse, field and fortress artillery on some such plan as that proposed.

There can evidently be no scope in an article of this description to enter into the details of such a reorganization, and the present scheme has no pretension of laying down anything of the nature of a dogmatic solution of the very large and important question which is now before the military authorities, and which must be seriously grappled with in the immediate future. "Si quod novisti rectius istis candidus imperti, si non his utere mecum."

ESPRIT DE CORPS, AN AID TO DISCIPLINE.

BY MAJOR SIR R. A. COLLETON, ROYAL WELSH FUSILIERS.

(From the Journal of the United Service Institution of India.)

ESPRIT DE CORPS has been somewhere defined as the art of abusing every other regiment than one's own. And this, no doubt, is the form that it sometimes takes and is perhaps the reason that that good old military virtue has of late years somewhat fallen into disrepute. At any rate it is a virtue that is but little inculcated in these unsentimental days; and I venture to think we lose thereby a valuable means for the maintenance of discipline.

But there is a spurious and a real *Esprit de Corps*. The false consists in resting on the past laurels of our regiment and priding ourselves on being Gunners, or Cavalry, or Guards, or Rifles, or Fusiliers, or Highlanders; thanking God, like the Pharisee, that we are not as other men are, without taking the trouble to show in what the superiority we claim consists. Those who possess the real *Esprit de Corps*, while priding themselves equally on the past achievements and good name of their Corps, endeavor to show by their conduct in peace, or war, that they are worthy inheritors of its reputation.

There are some who tell us that it is very snobbish thus to pride one's self on belonging to any particular corps—that officers and men in all regiments are drawn from the same sources and that consequently one regiment is as good as another—neither better nor worse. But these, I think belong chiefly to that class of mind of which we see so many instances in politics, men who are ardent lovers of all mankind and of every other country but their own. But it will be an evil day for the British army and the British nation if such ideas become general and the British soldier is taught to believe that he is no better than the soldier of any other nation. It was in exactly the opposite spirit that our fathers accomplished those great deeds, which have made England what she is, and the British navy and army glorious for all time. If history be true, our Elizabethan ancestors had a saying "one Spaniard lick two Portuguese, and one jolly Englishman

lick all three." This, in the eyes of some, is a deplorably Jingoe and chauvinist saying, which besides being untrue, is extremely discourteous to the friendly nations therein mentioned, and should therefore be consigned to oblivion as a remnant of barbarism. But all the same, that sentence, to use the slang of the day, is "Full of Merit"; and worthy to be remembered, not only by soldiers and sailors, but by all who have to struggle to overcome an adversary. For while I am not concerned to maintain the literal truth of the saying, there can be no doubt that the mere fact that a man is firmly convinced of his superiority over his adversary, must, if his faith be firm, go a long way towards making him superior. Let it not be thought that I advocate overweening conceit and despising one's enemy. Quite the contrary. Let us take beforehand all reasonable measures in order that we may deserve victory and then trust to the spirit of our Elizabethan forefathers to insure it.

I have hinted at the beginning of this lecture at my belief that *Esprit de Corps* has not now the same force in the army that it had in the past. Its decay is I consider, due to the following reasons;

1. The change in the nomenclature of the single battalion regiments which took place when the system of territorial regiments was introduced; which often resulted in two battalions being linked together which had no previous associations or sympathies in common. Indeed, it is notorious that in several instances these unions were extremely ill-assorted and the ill-feeling between the linked battalions was very strong. Under such circumstances it was inevitable, as the men changed backwards and forwards from one battalion to the other that the old battalion *Esprit de Corps* should die out, while the hostile sentiments of the officers prevented the cultivation of any new bond of union to take its place. This cause of decay acted in different regiments with varying degrees of intensity, some corps being more suitably mated than others. The soreness between linked battalions is now dying out and a healthy regimental feeling is beginning to take its place. But the soldier is a conservative animal and *Esprit de Corps* is a plant of slow growth, which cannot be ruthlessly dug up and transplanted in strange soil with impunity, but when grown, it sends its roots both wide and deep.

2. *Esprit de Corps* cannot, I think, be expected to have the spontaneous growth in the short-service soldier that it had in the old 21 years man, who spent the greater part of his active life in the service and whose regiment was his home. The classes from which the British soldier is drawn have an innate prejudice against the army as a profession, which is one of the greatest obstacles to recruiting. A man, as a rule, only enlists either through a love of adventure, because he is unable to earn a livelihood in civil life, or because he has had some trouble with the opposite sex. When he does "go for a soldier," he is generally considered by his friends and relations to have made a step on the downward path in life. The old-time recruit enlisted for 21 years and finding himself thrown among comrades similarly situated, and with whom *Esprit de Corps* and discipline had in the course of years become second nature, speedily and insensibly imbibed the opinions and habits of those about him, and learned to reckon at their true

value the prejudices of those who opposed his enlistment. The majority of recruits of the present day join with different ideas and under different circumstances. They have, as a rule, enlisted to avoid some temporary trouble at home and on joining, find themselves among comrades who are eagerly anticipating their release from the irksome control of military service, and their return to the freedom of civil life at the end of their first period of limited engagement. In such men the soil is not favorable to the spontaneous growth of *Esprit de Corps*, nor is there sufficient time for discipline to become a habit. In the short service soldier *Esprit de Corps* is an *Exotic* which must be carefully planted and tended before we can expect it to flourish.

And now let us consider by reference to times past what is the practical value of *Esprit de Corps*, and if it be worth the trouble necessary to instill it in the mind of the soldier. In order to do this we must turn to military history and more particularly to that much of it, which is contained in the Historical Records of our most famous regiments.

The English knights and archers who fought at Crecy, Poitiers and Agincourt possessed an intense pride of class, which was a species of *Esprit de Corps*. How heartily the English archer despised the bowmen of other nations, who unable to use bows of the weight and strength of the English longbow, tried to compensate for their inferior strength and skill by the use of the crossbow. What was it, but that just pride and confidence in himself and his fellows which enabled him so fearlessly to encounter and overthrow time after time apparently overwhelming odds.

That the Elizabethan navigators and adventurers possessed this pride of class in a marked degree is shown by numberless instances, and by the spirit which inspired that arrogant boast before quoted, "One Spaniard lick two Portugee, one jolly Englishman lick all three."

But Drake, Raleigh, Howard, Frobisher, Sir Richard Greville and others too numerous to mention proved time and again that it was no idle vaunt.

What was it but *Esprit de Corps*, combined with religious fanaticism and strict discipline, which made Cromwell's "Ironsides" the terror of their foes. Some may be inclined to assign the most important share in their success to their religious enthusiasm, but history tells us that their religion sat but lightly on many of them when in private, and was often only assumed as a convenient cloak. But granting that their success was due to the feeling that "God's saints" were irresistible, was this not also a kind of *Esprit de Corps*?

Coming to more recent times let us turn to the battle of Minden, when six regiments of British infantry—the 12th, 20th, 23d, 25th, 37th and 51st with a Brigade of Hanoverians, exposed in front and flank to artillery and musketry, charged in line and rolled back wave after wave of the Household cavalry of France.

Remember the conduct of the Fusilier Brigade at Albuera immortalized in Napier's splendid description of that battle. Remember the behavior of the 57th at the same battle, where fighting to the last, surrounded by numberless foes, they earned the glorious name of the "Diehards." Recall the deeds of the 28th and of the 92d Highlanders at Quatre Bras; the unshaken

firmness of the British squares at Waterloo, the victorious charges of the Heavy Cavalry, when the French Cuirassiers went down before the Union Brigade like grass before the mower. Consider the bravery of the Light Division at Alma, the charges of the Heavy and Light Brigades at Balaklava and the conduct of our hardly pressed and scattered men in the soldier's battle of Inkerman. Think of the hardships endured and heroism displayed by our men in the Indian mutiny. But what need further to multiply instances? Let any one ask himself, after studying the history of the corps and regiments of the British army, if some force, other than mere animal courage, was not needed to bring men victoriously through the dangers and perils therein related. And what was that force, which animated the British soldier to do such great deeds, but love of country, pride in his regiment, self-respect and a determination to do his duty at all costs, even that of life itself; all of which motives are summed up for the soldier in the term *Esprit de Corps*. There can then I think be no doubt as to the practical value of *Esprit de Corps* in war.

But we are not always at war: in fact many, I may say the majority of soldiers, go through their whole service without having had the chance of proving their discipline and courage in the field. What then can *Esprit de Corps* do for us in time of peace? It can I think do much to aid in the maintenance of that discipline without which the best armed men are a rabble and not soldiers. If it be continually instilled into the mind of the soldier from the time he joins until he leaves the service that he is the inheritor of the good name and reputation which his predecessors have earned for the regiment, and that while it is a privilege and an honor to belong to that regiment, he must constantly bear in mind that its good name and reputation are now in his keeping, and that it is his most sacred duty to hand them down to his successors unblemished and unimpaired. Make him understand that although he may not have the chance of distinguishing himself on service, cleanliness and smartness in appearance, the steady and cheerful discharge of all duty that may be required of him, whether pleasant or unpleasant, are certain methods of maintaining the good name of his regiment. Teach him that the man who shirks a disagreeable duty, or performs it sulkily or half-heartedly, who falls out on the line of march, or goes sick, without sufficient cause, is as certainly injuring the reputation of his regiment as if he were guilty of skulking on the field of battle; and that he cannot do any action, which is disgraceful to him as a man, without also disgracing the corps of which he is a member. If the soldier can be thoroughly imbued with such ideas as these, it will scarcely be denied that *Esprit de Corps* is capable of being a very powerful aid to discipline.

But I may here be told that there is much virtue in an "if" and that not until the Millenium arrives, will it be possible to substitute the fear of disgrace for the fear of punishment, as a deterrent to offenses against discipline, and that when that time does arrive, soldiers and martial virtues will be at a discount. I willingly admit that perfection, however much we may strive after it, is unattainable, nevertheless it is our duty not to cease trying to attain it. As long as human nature is what it is, it will never be possible

to dispense entirely with punishment for offenses against the law, whether civil, or military. But punishment is for the minority, and there is in all ranks and conditions of life a majority, who are restrained from the commission of offenses against the law, either by their consciences, or by the force of public opinion. *Esprit de Corps* appeals in a regiment both to the conscience of the individual and to public opinion, and the cultivation of that sentiment has for its object the increase of that majority for whom punishment is not required. It will I think be conceded by all, that that object is a worthy one to strive for, it only remains to consider how far our aim is a practicable one and how we should set about its realization.

Every regiment in the British army possesses its Regimental Record, in which is to be found its history from the time it was raised, and a more or less full account of the battles and campaigns in which it has taken part and the names of officers and men belonging to the corps, who have in times past specially distinguished themselves by their bravery and conduct. These records are official and were compiled in the Adjutant-General's office by Mr. Richard Cannon and were issued to the army in 1850. Some regiments, more fortunate than others, have lately had their records revised, expanded and brought up to date, my own regiment, the Royal Welsh Fusiliers, is one of these, and its history now extends to 1889, in which year was celebrated its bi-centenary. But even those corps, whose histories have not been revised since 1850 possess ample material to enable them to carry out the object with which these records were written. That object is clearly explained in the preface to the first edition, issued to the army in 1836 as follows :

"The character and credit of the British army must chiefly depend upon the zeal and ardor by which all who enter into its service are animated, and consequently it is of the highest importance that any measure calculated to excite the spirit of education, by which alone great and gallant actions are achieved, should be adopted."

"Nothing can more fully tend to the accomplishment of this desirable object than a full display of the noble deeds with which the military history of our country abounds. To hold forth these bright examples to the imitation of the youthful soldier and thus incite him to emulate the meritorious conduct of those who have preceded him in their honorable career, are among the motives that have given rise to the present publication."

Now I venture to think that the motives above set forth have been somewhat lost sight of, of late years, in the British army, and that while devoting much time and attention to such subjects as musketry, attack and defense and all that forms the physical and material side of a soldier's education, we are in danger of neglecting the cultivation of his mind and of those qualities, of which *Esprit de Corps* is the most important, that go to produce a good "morale," without which the soldier is a soulless machine, a steam engine without steam.

And yet that great commander, Napoleon, has told us that, "In war moral effects are to physical ones as three to one." That he acted uniformly on this axiom is evident from the perusal of those proclamations with which

he was in the habit of inflaming the ardor of his soldiers on the eve of the campaign, or great battle. That he was most sedulous in inculcating *Esprit de Corps* in his regiments is proved by many instances, the one which most readily occurs to me being that related by Baron de Marbot in his memoirs; when at the battle of Aspern and Essling, Napoleon was informed that one of his regiments had been driven by the Austrians out of the village of Aspern, its colonel killed and that it was retiring in confusion. Napoleon at once galloped up to the regiment and called for the colonel until at last some one ventured to reply to his repeated inquiries that the colonel was dead. "I asked where is he?" "We left him in the village." "What you left the body of your colonel in the hands of the enemy! Go back instantly and find it and learn that a good regiment should always be able to show its colonel and its eagle." The regiment at once turned back, retook the village and laid the colonel's body at Napoleon's feet.

But to return to the point from which I fear I have somewhat digressed. My proposal briefly is; that the history of his regiment should form part of the instruction of every recruit from the day he joins until he takes his place in the ranks as a drilled soldier. His attention should be especially drawn to those parts of it, in which non-commissioned officers or private soldiers are honorably mentioned and praised for their valor and good conduct; in order that he may understand that it is not only the conduct of the officers which brings credit or discredit on the name of a corps, but that on the contrary as there are many more soldiers in a corps than there are officers, so the former in proportion to their numbers have a greater influence on the name and reputation of the regiment. Teach him that it does not fall to the lot of every one to do "some great thing," but that he must not on that account, like the Syrian of old, despise and neglect the every-day work that lies to his hand in time of peace and that the reputation of the corps, which is in his keeping, is as surely maintained by the strict unostentatious performance of duty in time of peace, as by the performance of some conspicuous deed of gallantry in war. There should be a copy of the regimental records on the table of every reading-room in the regiment and it should be the text-book from which reading and dictation are taught in the regimental schools.

That the soldier of the present day is by no means insensible to the name gained by his regiment in the past is proved by the fact that on any occasion when the barrack rooms are decorated, such as Christmas day, the victories won by the regiment, invariably take their part in the adornment of the walls. But I fear that very few of the men could tell in what country the place which gives its name to the battle, is situated, against what enemy it was fought and what was the part taken by his regiment in gaining it. And yet without this knowledge, how can we expect the soldier to respond to a reference, in time of danger, to the past glories of his regiment. Of what use is it for an officer, in a tight place, to call on his men to "Remember Albuera" or "Alma" if the men are ignorant of all the circumstances connected with those battles. And yet the value of such stirring appeals in time of need has been recognized in all ages. How often did Napoleon bid his soldiers recall Marengo, Austerlitz, Jena, Eylau and Friedland and when

did they fail to respond to such an appeal. But then most of the veterans to whom those appeals were made, had either themselves taken part in those battles, or had become intimately acquainted with all the details connected with them. Is not a French mob lashed into frenzy by a reference to some date, which to the uninitiated means nothing, but which the people addressed know to be the date of some Republican or Revolutionary anniversary? Note the effect produced on an Orangeman by the mention of the battle of the Boyne, or on a modern Irish patriot when he is bidden to "Remember Mitchelstown." But in each of these instances, the effect produced on the hearer is proportional to his knowledge of the events to which allusion is made and the value he sets on the associations connected with them. It is for this reason that I hold it absolutely necessary that the soldier should be instructed in the history of the regiment to which he belongs. In addition to such instruction the officers when reproving an offender should endeavor to touch the man's pride, and appeal to his feelings of self-respect and *Esprit de Corps*. Those who have never tried the effect of such an appeal may perhaps smile and put me down as an unpractical theorist for making such a suggestion. But I can only say that I have tried it and often found it more effectual than punishment. It is more particularly in those offenses against military discipline, which are the most difficult to reach by the stereotyped methods, that this course of treatment will be found most effectual. Such offenses as "slackness of guard," "eye service on fatigue," "falling out on the line of march" and "going sick without sufficient cause," are of all offenses the most difficult of proof and at the same time the most destructive to discipline, because they are so insidious and far reaching in their effects.

It may be said that the regulations provide for the two latter offenses by directing the medical officer to mark any man for "duty" who "falls out" or reports himself sick without cause, and that every such man is to be punished. But if a man tells the doctor that he was obliged to fall out by a sudden colic, or that he has had bad fever during the night but is better now; how can the doctor contradict him on the spur of the moment? All he can do in case of doubt is to detain the man for observation, and there is no proof obtainable that he is malingering to shirk a distasteful duty, and so the offender escapes detection. Such a man may be known to his officers as a sneaking fellow and a real "Queen's hard bargain" and yet he may have a clean defaulter sheet, because the law cannot reach him. A few such men are a veritable plague spot in a regiment and will by their bad example do untold mischief, if their influence is not properly checked. The only means of doing this is to create a healthy public spirit and to make the men understand how unsoldierlike and unmanly such conduct is and how detrimental to the reputation of the regiment. Try and cultivate the feeling which existed in the old Highland regiments, when they were first raised and nearly every man in the regiment belonged to the same clan and district, which made the posting of the name of the man guilty of a disgraceful offense on the door of his parish church, the most dreaded punishment that could be inflicted.

The method which I advocate of appealing to the good feeling and

honor of the soldier is in use in the German army and is I believe regarded by them as the keystone of their system of discipline. In the French army this description of moral training is considered of the highest importance. The French "instruction Ministerielle" of 30th May, 1883, lays down that it is incumbent on officers to educate their men and to give them such instruction in military duty as will raise their moral standard, and at the same time give them a clear notion of their professional obligations. Again a circular of the Minister of War of 1887 prescribes that officers must exert themselves to develop in their men the fundamental principles of discipline, love of duty and obedience to orders, and suggests that the idea of patriotism, sacrifice for, and devotion to one's country, may be evoked by the recital of instances taken from the annals of the army. With this end in view Captain J. Maurie and A. Basille have compiled "*Le Livre du Bon Soldat*," which contains some 200 well authenticated anecdotes, which the reviewer of the *Royal United Service Institution Journal* considers to be admirably calculated to excite the interest of the soldier and to impress on him the principles above referred to. No one will I think care to assert that the British is less sensitive to appeals to his honor and patriotism than the German, or French soldier, and if the Germans and French find it possible to inculcate such feelings in men who serve barely three years with the colors, it ought to be still more possible for us with men whose term of service with the colors is more than double that of the soldiers of continental armies.

In time of war there are other chords which we can touch with a view to raising the soldier's morale. It appears to be the custom of late years to leave the colors of a battalion at the depot before going on service or sometimes they accompany the regiment and are left at the base, or if taken into the field at all, they are kept in the rear under escort, apparently because in the existing era of breech-loading rifles and loose order fighting they would be in great danger of being lost; greatly to the dishonor of the regiment. But this idea seems to me to be on a par with that which formerly prevented the artillery from bringing their guns into action at close quarters, for fear of incurring the disgrace of having them captured. But that idea is now happily exploded and the loss of guns which have stuck to their work to the last in support of the other arms is now considered in no way disgraceful; but the dishonor would rather lie in saving them at the expense of the loss of their support at a critical moment. If the colors are too valuable to risk, why retain them at all, for their value in the eyes of the soldier lies in the fact they (for the colors, like the king, never die) have waved and guided the regiment to victory in every battle inscribed on their folds. And who can question the value of the colors to the worn-out soldier, in the moment of depression, when he feels he can do no more, and victory, or defeat, hang in the balance. If any doubt, let him read Kinglake's account of the Alma, when the Queen's color of the Royal Welsh, in the hands of young Anstruther, led the light division to the assault of the Great Redoubt. And how many instances of a like nature could not be quoted by other officers versed in the records of their regiments? No, so far from keeping the colors out of danger let them be seen always in the

thickest of the fight and let the soldier be taught that so long as a man remains alive it is his duty to defend them to the last. To lose colors in this way is no disgrace and the lives of those who fall in carrying them will be well expended.

The band of a regiment is often treated in much the same way as the colors, or if brought into the field, the men are used as stretcher bearers. Martial music is an incentive to a soldier's spirit, which should by no means be neglected, and one that was made use of by Skobeleff when his regiments marched, with all their bands playing to the attack of the Green Hills at Plevna.

In fact if we wish for success in war we should neglect no means of raising the morale of our men. It is useless to appeal in the day of battle to the *Esprit de Corps* of our men and past glories of our regiments, if we have neglected to prepare the soil and sow the seed in time of peace.

Above all things combat that damnable doctrine that steam and the breech-loader have reduced all men to the same level and that the British soldier and sailor, being no better armed than their enemies, are no better than the soldier or sailor of any other nation, and that one man is as good as another. All history teaches us the contrary and that it is not the weapons, but the superior skill and nerve of the men who use them, and the ability to stand "hard pounding" the longest that makes the difference between victory and defeat.

Although in the foregoing remarks I have spoken only of the British soldier, no one who knows the pride of race which animates the Sikh, Gurkha, Rajput, Pathan and other warrior castes of which our native army is composed, will doubt that the systematic moral training and cultivation of *Esprit de Corps* which I have been advocating, is as applicable to the native soldier as to his European comrade. The most casual study of the army list and of the history of India for the last 150 years will suffice to show that there is no lack of examples which can be held up for emulation to the native soldier of the present day; while the behavior of the Madras sepoys at Arcot under Clive, the conduct of the Bombay Grenadiers at Karegaum, the march of the Guides to Delhi during the mutiny, are achievements of which any army might be proud.

Some time ago when reading "the Saturday" I was very much struck by the review of a book by a Frenchman, M. Hector France, who criticises the British army and its achievements in no friendly spirit. He vigorously denies that the British soldier is better than the soldier of any other country, "La Belle France" for instance, but he attributes the many victories of the Britisher entirely to his insufferable conceit, which when he had been handsomely beaten, prevented his believing in the possibility of his defeat, and retiring from the field as he ought to have done if he played the game fairly. But says M. France, "what can you do with men who are so infatuated with conceit that every private soldier says to himself: 'The British army is the finest in the world, my regiment is the finest in the British army, and I am the finest soldier in my regiment.'" Clearly all argument mental or physical, is thrown away on such people. There, we see ourselves as others see us, but I fear the picture is too flattering. I venture

to think there is a most valuable lesson to be learnt from M. France's criticisms on us; although not the one perhaps he intended to convey. The words put in the mouth of the British soldier by M. France express precisely the spirit in which I should like to see him take the field. If we can induce the soldier to have this high opinion of himself and to justify it by endeavoring to live up to this ideal in time of peace, we shall have succeeded in creating an *Esprit de Corps* of the highest order, which will sparkle with no evanescent crackling blaze, but which will burn with a steady glow like the fire on the hearth of the blacksmith's forge, which one blast of the bellows converts into a fierce consuming flame.

ARTILLERY OF LARGE CALIBRE WITH FIELD ARMIES.

(From *Revue Militaire De L'Etranger*.*)

BY LIEUT.-COLONEL J. H. G. BROWNE, LATE R. A.

Proceedings of the Royal Artillery Institution.

IN a recent number of the R. A. "Proceedings,"† attention was called to the steps taken by Germany toward the formation of heavy batteries with sufficient mobility to be attached to armies of operation.

The same idea is in vogue in other countries, although in some cases the period of practical organization has not been reached, the question of principle has been everywhere decided. Without speaking of Switzerland, where heavy batteries have been in existence ever since 1883 under the name of "artillery of position," we know that Austria and Russia, as well as Germany, actually possess artillery of large calibre, intended to march with field armies.

Austria in time of war would form groups of portable siege batteries intended, according to official indications, not only for siege-warfare, but also for certain operations of field warfare.

The personnel of these batteries is to be furnished by the garrison artillery, and the horses by the transport department. It is believed that the Austrian-Hungarian ministry has provided for the formation of five groups of portable siege batteries, comprising each, one battery of four 12^c guns and two batteries of four 12^c mortars.

Some years ago Russia organized regiments of field-mortars of 15, actually furnishing 20 batteries. More recently she has created three battalions of so-called siege-batteries, which are absolutely distinct from the battalions of garrison artillery. The official documents do not lay down the manner in which these batteries are intended to be employed, but it is probable that it will be connected with the question now before us.

The organization adopted by Germany is not known in its details, but it

* February, 1895.

† Foot Artillery with horsed carriages in Germany.—April, 1895.

is in a very advanced condition. The credit demanded by the War Minister in 1892, in order to form 17 groups of teams of horses intended for foot artillery, has just been partly granted, and it seems certain that the matériel of these heavy horsed batteries will be principally composed of 15c howitzers.

Without going further into organization properly so-called, we have said enough to show that artillery of large calibre has acquired a definite position in foreign armies. It is therefore absolutely necessary to consider the rôle which will probably be assigned to this kind of artillery, and the rules which will guide its employment under the various conditions of warfare. In default of official instructions dealing with the question, we can only follow attentively the military publications which have appeared abroad, in order to glean from them, if possible, some ideas which will throw light upon the new problem now presented.

If we examine the reasons which have eventually led the Germans to form heavy portable batteries attached to field troops, we shall find that the promoters of this transformation have drawn their strongest arguments from the probable character of the wars of the future in the particular theatre of operations, which is especially interesting to Germany. According to them, the German armies will act on the offensive, and will certainly have to encounter permanent works manned by armies strongly entrenched upon positions prepared in advance, and it will be absolutely necessary to provide them with an artillery sufficiently strong to obviate the risk of their being shattered upon these obstacles. According to General Speck and others, the heavy artillery, attached to armies of operation, is intended exclusively to act against permanent and temporary works of fortification.

General Speck, in particular, taking the supposition that four armies are operating upon the western frontier of the empire against fortified positions, would attach the heavy batteries to the two armies entrusted with the front attack, giving none to the two other armies intended to guard the flanks. This amounts to saying that this heavy artillery would not be attached to armies of manœuvre.

Now that the desired object has been attained, and that the organization demanded by the reformers is an accomplished fact, so much so that foot artillery with horsed carriages—the fourth arm as it may be called—has actually taken part in combined manœuvres with field troops, the military writers, who treat of this question, seem to have modified and enlarged their ideas. They are inquiring whether this kind of artillery—created with a view to a particular case—ought to be restricted to the special rôle which was originally assigned to it, or whether it ought not in future to be looked upon as a necessary element in armies, independently of any peculiarities which may be presented by the theatre of operations.

The advantages claimed to be derived from the employment of this new arm are:

1st. A moral advantage, because their addition to armies of manœuvre would act as a new affirmation of the spirit of the offensive and of the will to conquer, at a time when the power of fire-arms furnishes argu-

ments in favor of the defensive, and induces many people to exaggerate the difficulties of the offensive.

2d. Considerable material advantages in the battle itself, because this heavy artillery will be a powerful and hitherto unknown means of deciding the contest more rapidly than heretofore.

The following words occur in an article recently published in the *Militär Wochenblatt*: "When the battle is sufficiently advanced to enable the forces in presence of one another to be estimated, then the moment has arrived to bring the heavy batteries into play, with a firm resolve to decide the issue. Thanks to the enormous effects of their projectiles, they will produce, both morally and physically, an effect which it would be impossible to obtain by other means. The fact, that the effect produced by pieces of large calibre is incomparably greater than that produced by pieces of small calibre, then shows its full significance and largely compensates for the restrictions placed upon their use by the smaller supply of ammunition.

"This superiority shows itself in isolated effect, because the penetrative and the explosive force of the projectile are both greater in the case of heavy calibres, and it also shows itself in cumulative effect, because in the same space of time a greater weight of metal can be projected upon the target, which amounts to saying that the same effect can be produced in less time.

"This concentration of useful effect, this accumulation of destructive effects, gives to this attack the terrifying character of a whirlwind let loose by the elements, and adds to a condition of absolute depression the moral effect which is produced by the efficaciousness of fire. The effect of surprise is added to this moral depression, without counting the fact that the enemy has little time to adopt new dispositions in the face of the danger which threatens him. This last advantage is a very important one, the value of which will be especially felt in the battles of large masses, when the influence of space will be felt to a greater extent."

Thus the opinion now expressed in the German military press is that the heavy *artillerie d'armée* can and ought to be used in field warfare and that it should take an active part in battle.

In itself there is nothing unreasonable in this idea. In fact it may logically be deduced from the generally admitted principle that it is the duty of the commander-in-chief to concentrate all the available forces of the army upon the battle-field, which is the highest object of war and the issue of which decides the fate of the country. The difficulties begin, and the objections have more force, when we come to the conditions of practical realization. In fact we find ourselves face to face with a problem which cannot have a perfectly satisfactory solution, because on the one hand it is laid down unanimously that the introduction of heavy artillery into field armies must not make them lose their facility for manœuvre; whilst on the other hand, the reasons which have led to the introduction of this artillery are almost entirely based upon their power, which entails increased weight. It is necessary therefore, in order to arrive at a suitable organization, to accept a compromise, and it is here that the solutions adopted in different countries differ among themselves. For example Russia has kept to

the 15^c calibre, but has sacrificed the power of the piece of its other characteristics, so as to make it, as far as mobility is concerned, a true field-gun. On the other hand in Germany the military writers who have treated of this question, recommend that the present matériel should be maintained, lightened only by a suitable reduction in the quantity of ammunition carried. In fact they consider that the heavy artillery should only be employed upon points and under circumstances where it alone can produce decisive results.

"The object of the heavy batteries," says the author of the article quoted above, "is to shake the enemy's infantry upon the point where the commander-in-chief has decided to break through. If more than this is required of them they will fail. The talent consists in keeping the right limit."

According to German ideas it is absolutely necessary that the *artillerie d'armée* should not be engaged in the artillery combat, in order to preserve the power of producing at the proper time new effects in a startling manner.

It is evident that by limiting the task of the heavy artillery to preparing the breach, the necessary time will be gained to enable it to be brought into line, when required, without checking the movements of the other arms, and also that the equipment can be very much lightened, because a comparatively small supply of ammunition will be sufficient. It may be remarked—and it is a coincidence of some importance with regard to the rules for the employment of this arm—that the Russian opinions on the employment of the 15^c mortar evidently agree with those which have just been expressed. At a conference recently held at Moscow it was held that mortars ought not to be brought into line during the artillery combat, but that they should remain with the general infantry reserve until they are required to prepare the way for the attack.

It would be quite premature to draw any absolute conclusions from the preceding remarks. Our object has simply been to show that in foreign countries much attention is being paid to questions relating to the employment of the heavy artillery, which is now practically organized in most of the armies of Europe.

The ideas put forward point to the employment of this artillery in field warfare, and assign to it a well defined rôle upon the field of battle, namely to prepare the breach at the point selected by the commander-in-chief.

Both in Russia and in Germany the principle is admitted that artillery of large calibre should be reserved for this purpose. If we wish to summarize the present ideas, it may be said that what is recommended is the creation of an ideal artillery reserve, sufficiently light not to interfere with the manœuvring power necessary for field armies, but at the same time powerful enough to provide the commander-in-chief with a certain means of forcing on the decision of the combat by producing effects hitherto unknown both in a material and a moral point of view.

THE EVOLUTION OF SMOKELESS POWDER.*

By ROBERT C. SCHUPPHAUS, PH.D.

SMOKELESS explosives of which gun-cotton and nitroglycerine are the most important representatives, have been known for a long time. The first discovery in this line was made by Braconnot in 1832, when he found that starch and similar bodies were rendered highly combustible through treatment with nitric acid. Six years later, Pelouze took the subject up and extended his researches to cotton, paper, and other vegetable substances. He found that the carbohydrates gained in weight when subjected to the action of nitric acid. Dumas pursued the subject further and proposed to make nitramidine, as he called nitrocellulose made from paper, into cartridges. But the nitro bodies produced by these early investigators lacked stability and uniformity, and nothing came of these experiments. The foundation on which the structure of high explosives rests was laid in 1846 by Schonbein, who first succeeded in producing true gun-cotton, and who introduced the mixed acids bath, consisting of highly concentrated sulphuric and nitric acids. In his subsequent work he enjoyed the collaboration of Bottger, who had independently arrived at the same results. This fundamental discovery was quickly followed by Sobrero's preparation of nitroglycerine in 1847 accomplished in Pelouze's laboratory. The same year, Dr. Maynard, of Boston, discovered soluble gun-cotton, and applied its solution in a mixture of ether and alcohol, collodion, to the purposes of surgery. Nitroglycerine likewise found its first application in the United States, though not for its explosive properties, but as a medicine.

For convenience sake, I make use of the traditional terms soluble and insoluble gun-cotton. We must not forget, however, that soluble pyroxyline exists in a great many varieties, and that the various grades employed in the arts, as, for instance, the manufacture of celluloid, the production of varnishes, the preparation of collodion, of typical blasting gelatine, of smokeless powder, exhibit great differences in chemical composition and degree of solubility.

The insoluble variety, so called, is insoluble in a mixture of ether and alcohol and some other liquids, which either dissolve or soften the soluble grade, but is easily dissolved by acetone and compound ethers, such as the acetates of methyl, ethyl, and amyl, and is also soluble in nitrobenzene and nitrotoluene. To avoid tiresome repetitions, I will follow the course which the industrial applications of the soluble grade took, though I may thereby slightly disturb the chronological order. But it is the experience gained in these new industries which has proved indispensable to the manufacturer of modern smokeless powders. In 1851, Archer and Fry invented the collodion emulsion, and thereby vastly improved the art of photography. In 1860, Barnwell and Rollason proposed to use pyroxyline solutions as varnishes, and to make from such solution a multitude of useful articles. Soon after the subject was taken up by Alexander Parkes, of Birmingham, the inventor of Parkesine, and by Daniel Spill, of London, afterward manager of the

* From the Journal of the Society of Chemical Industry.

Xylonite Company. In the United States, J. A. McClelland and John W. Hyatt were at work to utilize the valuable properties of soluble pyroxyline.

But an invention overshadowing all the others in importance was made by Daniel Spill in 1869, when he first produced a pyroxyline-camphor composition, plastic at about 75° C., by gelatinizing pyroxyline by means of a solution of camphor in commercial grain alcohol. As far as the chemical side is concerned, Daniel Spill must be hailed as the father of the celluloid industry, while to John W. Hyatt, at that time of Albany, N. Y., the greatest credit is due for devising suitable machinery for the intricate processes involved, for discerning the importance of pure materials, and for the perseverance which he exhibited under most adverse conditions. To-day the world's daily production of celluloid amounts to 30,000 lbs. To us the most important fact is that, there was no difficulty as far back as 1870 to fashion soluble pyroxyline into sheets, rods or tubes. Nor had it escaped observation that the gelatinized product was not nearly as explosive as the flocculent material.

After this short digression let us return to gun-cotton proper, and to the attempts made to utilize it as a propulsive agent. Sportsmen looked hopefully to it directly after its first production, and fibrous gun-cotton rammed into cases was used as a powder charge, but as is easily understood, with disastrous results. The feverish activity displayed in European countries to make and use gun-cotton gave way to a feeling of apathy after the numerous failures and frightful accidents which were due to faulty processes of manufacture and an insufficient knowledge of the new explosive. But carefully conducted experiments had convinced the Austrian General Von Lenk of the great promise of gun-cotton, and from 1849 to 1852 he worked indefatigably on improved processes of manufacture.

In 1853 the Austrian government erected works where the general's processes were carried out. Von Lenk recognized that it was necessary to decrease the rate of burning in order to utilize gun-cotton as a propelling powder; that, in other words, it was necessary to diminish the air spaces in the material to a minimum—to condense it, if I may use the term. What his successors have accomplished by the use of gelatinizing fluids he tried to attain by mechanical means, and to that end twisted and braided nitrated cotton yarn into ropes and cylindrical wicks. In the early sixties no less than thirty batteries of Austrian artillery fired gun-cotton cartridges from rifled cannon; they used smokeless powder.

Similar cartridges were tried in small arms, and the bursting charge of shells consisted of Von Lenk's plaited gun-cotton. The material was definitely abandoned in 1865, after two large magazines had exploded in 1862 and 1865 from an unknown cause. Shortly afterward, Uchatius, another Austrian officer, tried to introduce nitro-starch into the service, but its lack of stability, as then prepared, and its physical properties unfitted it for the purpose. In the meantime the English government, to whom Von Lenk's process had been communicated, had instituted experiments on a large scale under the direction of Sir Frederick Abel. The same year that Von Lenk's labors were brought to such an unhappy conclusion, Abel pub-

lished his process of pulping and compressing gun-cotton, which marked a new era in the history of this explosive.

This method permitted the manufacture of an absolutely stable article; and no higher testimony to its intrinsic worth is needed than the fact that it has remained the standard method of treatment of nitrated cotton all over the world, though in the nitration proper, in the apparatus employed, and in the restoration of spent acids great improvements have since been made.

At this time appeared the first semi-smokeless sporting powder of Col. Schultze, of the Prussian artillery, embodying an idea first propounded by Barnwell and Rollason in 1860, namely, to replace the carbon of ordinary powder by finely comminuted pyroxyline. Schultze was aided in his experiments by Captain Dittmar, of dualin fame, also of the Prussian artillery. The original Schultze powder consisted of a wood cut into grains, purified, nitrated, and finally impregnated with nitrate of potassium or both the nitrates of potassium and barium. Dittmar subjected the wood to a peculiar heating process before nitration, and his powder is to this day manufactured by the American Wood Powder Company. Both these powders were tried in the United States in rifles, by Government officials, as well as the testing station of a large ammunition firm, and found utterly worthless for that purpose. The Schultze powder of the present day is very much like the E. C. which is made from pulped gun-cotton and nitrates, and has been brought to its present state of perfection through the efforts of Messrs. Reid and Johnson. Both these inventors have profited by the experience of the celluloid manufacturers, and employ solvents of pyroxyline to harden the grains. But this powder belongs to a later date, the early eighties.

Messrs. Prentice & Sons, of Stowmarket, the first private manufacturers of gun-cotton, tried in 1866 to supply the wants of the sportsman in a different way. They made a cartridge of felt-like paper, composed of gun-cotton and ordinary cotton, produced from a mixture of the pulped materials, which found much favor. Later they made a pellet of slightly compressed gun-cotton, waterproofed by an India rubber varnish. These were not sufficiently uniform for military purposes. Abel produced similar ones which gave very promising results in a Martini-Henry rifle. From 1867-68 he experimented at Woolwich with cartridges built up from compressed gun-cotton fired from bronze field-guns, but found little encouragement, though the results were ahead of those obtained with Von Lenk's cartridges. The time had not yet arrived when a powder of the highest power, which of its very nature involves the absence of smoke, had become an urgent necessity.

While these attempts were made in England to obtain an improved powder from gun-cotton which was naturally smokeless, in France experiments were steadily going on with another material, picric acid, which also yielded powders comparatively free from smoke. Two powders, those of Designoile and Brugère, came to the front, the former consisting of picrate of potash, saltpetre and charcoal, the latter of picrate of ammonia and saltpetre. Brugère's powder especially gave excellent results in a Chassepôt rifle. Smoke and residue left in the gun were greatly reduced. This pow-

der was used experimentally in the French army up to the time that the mysterious Poudre B made its appearance, and was later superseded by the laminated gun-cotton powder of Vieille and Sarrau. Up to this time several inventions had been made which were to play an important part in the future rapid development of smokeless powders. As early as 1875 Daniel Spill had taken out a patent for the production of tubes for military and other purposes from soluble gun-cotton, and among other solvents for the material he mentions alcohol and ether and nitrobenzene. We have here the forerunner of Hiram Maxim's and of Anderson's gun-cotton cords, and of Prof. Munroe's indurite. The same year gave us Alfred Nobel's magnificent invention of explosive gelatine, the prototype of ballistite and cordite.

In 1882, as previously mentioned, Reid and Johnson obtained their patents for producing hard grained sporting powders. The French military authorities took early note of their results. The following year Wolff and Max von Forster, a former captain of engineers in the German army, patented a process for the manufacture of grains of compressed gun-cotton with hardened surfaces. The surface of the grains was gelatinized by dipping the grains in ethyl acetate, nitrobenzene, or similar solvents of gun-cotton. These grains were to be used as charges for shells and aerial torpedoes. Petri, Fallenstein and Lisch in 1884 brought out an explosive, the base of which consisted of gun-cotton dissolved in nitrobenzene. At this time conditions arose that made a powder of high power and free from smoke a necessity. A powder of the highest power must needs be one that is totally resolved into gaseous products—it must be smokeless. It had been recognized long before the days of smokeless powder that it was necessary to get rid of any solid residue of smoke to attain ideal results. Smokeless is a concomitant feature of high power, and *vice versa*.

The naval service needed a smokeless powder for the use of its secondary batteries to ward off the attacks of torpedo boats, and the infantry required an improved powder, if any further advance in the accuracy and range of its rifles was to be made. The calibre of the small-arms of all armies has slowly, but surely, grown smaller and smaller. And for obvious reasons. A much more steady flight can be imparted to a projectile of smaller diameter and elongated form than to the old fashioned bullet. This new projectile being a good deal lighter, requires a much increased velocity of travel to maintain its energy, its striking force. The greater velocity means a flatter trajectory, an increased accuracy of fire. Black powder, of which only about one-third is converted into gaseous products, which have to project the other two-thirds as dead ballast, was not equal to the new task, especially in the reduced powder chamber. It had already proved unsatisfactory in the interesting struggle between armor and rifled cannon. The great improvements which Major Rodman and Doremus, of the United States, had made in the physical characteristics of black powder through their invention of prismatic powder had not been sufficient. Heidemann, of the Westphalian powder works, and Duttchenhofer, of the Rottweil works, invented nearly simultaneously the brown powder, and brown prismatic is used to this very day in heavy ordnance, though smokeless powder is pressing it close. This brown powder contains more saltpetre, less sulphur and

instead of the common carbon underburned charcoal, similar to the carbon rous of Violette, which he proposed in 1847 for sporting powders.

Gans conceived the idea in 1885 of producing an improved powder through the substitution of sulphur by nitrate of ammonium. By using a certain proportion of the latter in conjunction with charcoal and salt-petre he imagined to have produced a powder which would not absorb water, and in the explosion of which potassium amide would be formed. Such was, of course, not the case; the powder was far from smokeless, and it was hygroscopic. Heidemann modified Gans' formula, and produced a powder possessed of remarkable ballistic properties. It furnishes comparatively little smoke that speedily disperses, and is less hygroscopic than any nitrate of ammonium powder hitherto prepared. The pressures in the chamber are lower, along the bore of the gun higher than with brown powder. This behavior is similar to that of the smokeless powders with gun-cotton base. For use in machine-guns this powder was sealed up. But even when confined it is subject to changes, due to uneven distribution of heat during storage, and consequently lacks uniformity. Though it must be regarded as the first successful attempt toward the production of a smokeless artillery powder, it cannot be considered adapted to the requirements of naval service.

At this time, in 1886, the poudre B of Vieille and Sarrau appears. It consisted principally of gelatinized gun-cotton in the shape of laminae, probably combined with picric acid or a picrate, compounds which, in the shape of poudre Brugère and Turpin's melinite, had long been employed in the French service. Recalling to our minds what had been accomplished up to that time, we need not wonder that the other European powers experienced no difficulty in duplicating the French powder and improving on it. The rifle powders of the European armies of the present day, with the exception of the English, are laminated gelatinized gun-cotton, both the soluble and insoluble grades being used. The v. Forster, the Walsrode, the Troisdorf, the latest Wetteren, Rifeite, belong to this class. The same compound, produced in proportionately larger dimensions, has been tried in field-guns, but with no flattering success, as far as experiments conducted at the Sandy Hook proving grounds indicate. Better results have been achieved with a powder issued by the French government for the proof of guns, but not used in actual service, the poudre "B. N." This is composed chiefly of soluble pyroxyline and nitrate of barium, and is a kind of condensed tonite, rolled or pressed into dense striated sheets. These are broken along the grooves into strips and packed in bundles to make up the cartridges. There is some smoke and considerable residue.

Alfred Nobel produced an entirely different artillery powder. It had long been known that explosive gelatine, especially when the percentage of pyroxyline was run up, possessed considerable propulsive power. Mixtures containing much more than the usual quantity of nitrocellulose, and even true gun-cotton in addition, had been prepared. The use of volatile solvents, though not required in the production of true gelatine, to promote gelatinization, was well known. Celluloid manufacturers had incorporated oils, resins, and similar bodies with their compounds to obtain certain results.

Nobel himself produced in 1888 an explosive celluloid, to serve as material for the manufacture of a fuse both waterproof and burning under water. He dissolved in nitroglycerine one-sixth of its weight of camphor and incorporated therewith one-half its weight of nitrocellulose by mastication between warm rolls. A compound of similar composition was the first Nobel powder, and the one described in the United States patent of 1891 differs only in so far from it as it contains about equal parts of nitroglycerine and nitrocellulose. The presence of camphor, owing to its great volatility, was a serious drawback, and Nobel soon dispensed with it. His proposition to evaporate it by means of a current of warm air is clearly impracticable. An important advance was made in 1889, when it was found that nearly any quantity of suitable nitrocellulose, even in the wet state, could be gelatinized by means of nitroglycerine. This was accomplished by malaxation between heated rolls. It had been a common practice of the workmen in explosive works, at least in the United States, to surreptitiously add water to a batch of gelatine in the course of manufacture to hasten the gelatinizing process. This new Nobel powder, containing a slight percentage of diphenylamin to secure its stability, and cut up into cubical grains, has given excellent results in cannon. Powders of similar composition, but with a reduced amount of nitroglycerine, and cut up into smaller grains, were manufactured for rifles. The original Wetteren powder of Belgium was such a powder, though not manufactured after Nobel's latest process, but by means of a solvent—acetate of amyl in this case.

In 1888 Hiram Maxim, and simultaneously Anderson and Anderson, proposed to give definite shape to gelatinized gun-cotton by forcing it through holes or slits, and thus form it into strips, cords, and the like, which might be cut up. The grains thus produced, if composed of pure gun-cotton, are rather difficult to ignite, and certainly not suited to small-arms. It is not expedient to force materials below a certain thickness through holes. If thin laminæ are desired, it is better to produce thin sheets and cut these into grains or strips.

Nobel's powder had been submitted to the English government, and had also become known to certain manufacturers of guns and ammunition, themselves bent upon evolving a suitable smokeless powder. Cordite, composed essentially of gun-cotton and nitroglycerine, united by means of a mutual solvent, and shaped into cylindrical cords, became first known in 1889. Abel and Dewar, Hiram Maxim and Hudson Maxim, of New York dispute the priority of the invention. Abel and Dewar preferred to use true gun-cotton, and added tannin to the mixture as a restraining agent, while Hiram Maxim, employed castor oil for the same purpose. The cordite, fired at the present time in the large calibres in the English service, contains an addition of vaseline. Hudson Maxim's cordite for rifles, tried at the Springfield Arsenal early in 1890, consisted of about equal parts of military gun-cotton and nitroglycerine, with a slight percentage of castor oil and of carbonate of magnesium as a neutralizer.

The great claims made for Guttler's "*Plastomenite*," patented in Germany in 1889, do not seem to be justified, when its composition is considered, nor are they borne out by experience. It is made by dissolving nitro-

carbohydrates, such as soluble nitrocellulose, in solid nitro-hydrocarbons, dinitrobenzene for instance. I will only add that this process was known and described in the United States in 1882.

Schuckler's powder, which was patented in 1890, is made of nitrostarch, gelatinized by means of nitrobenzene. It has not been manufactured to any extent, and there is no reason why gun-cotton, stable, easily made and eminently adapted to the purpose, should be abandoned in favor of nitro-starch.

Kolf's powder may be passed by, as may be others made of gun-cotton, but not gelatinized, such as proposed by v. Brauk, v. Romocki, and Dr. Emmens' gelbite. Nor do the various chlorate of potassium mixtures deserve more than a passing notice. V. Brauk's original recipe calls for a mixture of carnauba wax and lycopodium in conjunction with the chlorate. Later he employs gum tragacanth, dammar, resin, and other substances. Schnebelin's powder, which attracted a good deal of attention some time ago, is made of starch, mixed with a little vegetable pith, and converted into a paste by the addition of a chlorate solution. This paste is rolled out, dried, and grained.

It was not before 1890 that the United States Government took up the subject of smokeless powder. The first powder of domestic manufacture submitted was Hudson Maxim's cordite. Cut in lengths to fit the cartridge cases, it gave excellent results, both as regards pressures and velocities. The difficulty of loading was so great, however, that a shorter grain had to be selected, with a corresponding increase in the pressures, but even then giving results far better than could be obtained with Walsrode, Wetteren, Dupont's modified Wetteren, Nobel, or B. N. The same year I submitted a rifle powder of a short cylindrical grain, made of gelatinized military gun-cotton combined with the nitrate of an organic base. Another variety consisted of a compressed mixture of soluble and insoluble gun-cotton, the former only being gelatinized. But the ignition with the primers then in use proved so difficult that I abandoned these powders in favor of a nitroglycerine composition, all the more readily as it was impossible to equal the records of the other nitroglycerine powders. This new powder consisted of a peculiar grade of soluble pyroxyline, nitroglycerine, and shellac. For various reasons I substituted dinitrobenzene for the latter. All my powders contained urea to guard their stability. This powder gave a somewhat better record than the Maxim, and was also fired with satisfactory results in the 8-inch B. L. rifle. I give these details because a certain other powder of very similar composition has been extensively advertised. The similarity is by no means accidental. To show how easy it is to invent, and how dangerous a little knowledge is, I quote from the specification:

"Gunpowder, consisting of gun-cotton, nitroglycerine, lycopodium, and a neutralizer of free acid, such as urea crystals or dinitrobenzol." The equivalence of urea and dinitrobenzene had not been suspected up to October 24, 1893, the date of the patent in question.

The Ordnance Bureau of the United States Navy made extensive experiments with Prof. Munroe's indurite. The method of manufacture consisted in preparing gun-cotton of uniformly high nitration, converting this

into a colloid by means of nitrobenzene shaping this colloid into cylinders or tubes, and hardening these by the well-known process of steaming. Gun-cotton, as first manufactured, was subjected to extraction with suitable solvents to free it from the lower grades. There are no difficulties to obtain a high and uniform nitration on a manufacturing scale by easier means. The choice of the gelatinizing agent does not seem especially fortunate. Though the firing tests with individual samples were very favorable, there seemed to be some difficulty in duplicating results. The ignition, too, is very difficult. At any rate, the navy has abandoned this powder, and is now conducting experiments with a powder practically identical with the French B. N. Insoluble gun-cotton has been substituted for the soluble, with a corresponding decrease in the quantity of nitrate of barium incorporated with the gun-cotton.

The Peyton powder, manufactured by the California Powder Works, contains, in addition to gun-cotton and nitroglycerine, ammonium picrate and apparently some carbon. It has given satisfactory ballistic results in the 0.30 calibre rifle and in the 3.2 field gun. As much as the examination of a couple of grains can show, the powder seems to be prepared by making a dough-like mass of the gun-cotton and nitroglycerine, incorporating the picrate with it, and then moulding the mixture. The incorporation is not thorough, small yellow lumps showing everywhere.

Two years ago Mr. Hudson Maxim and myself began experiments looking toward the throwing of aerial torpedoes by means of powder. In the course of our investigations, we developed a powder which is admirably adapted to artillery use, and has been successfully fired in field-guns and in the heavy coast-defense rifles. The Maxim-Schupphaus cannon powder is a colloid, nearly all gun-cotton in the shape of multiperforated cylinders. It is well understood that a smokeless powder should contain a minimum of nitroglycerine, not only on account of its volatility and the consequent changes in composition, but to minimize the erosive effect of the powder gases. The multiperforated grains burn with an increasing surface, which means that an ever-growing volume of gas is generated while the powder chamber is being enlarged through the travel of the projectile along the bore. In this way it has been possible to rival the records of typical nitroglycerine powders with a powder nearly all gun-cotton.

It remains for me to refer to the decided influence which the improved military powders have exercised on the sporting powders. There are now several brands on the market which are nothing but gelatinized gun-cotton. To this class belong the v. Forster powder, in thin flat or curled laminae, the rough-edged Walsrode, the globular Dupont, produced by gelatinizing finely comminuted gun-cotton suspended in water by agitating it with a solvent insoluble in water, and the nitroid of the Maxim Powder and Torpedo Company. The improvement of the latter powder is in a large measure due to the indefatigable exertions of our able assistants, Messrs. Frederick McGahie, M. E., and Edwin Taylor. A new French sporting powder, invented by Mr. Bruneau, contains dichromate of ammonia.

The effect of this vast development on allied industries has been widespread. Special factories have been built to cleanse cotton waste for nitra-

tion, and great efforts are being made, more or less successful, to make suitable cellulose from wood. The production of nitric acid shows an enormous increase, and the commercial product is of a concentration and purity never attained heretofore. The manufacturers of sulphuric anhydride have found a new outlet for their product. Acetone plants of large capacity, furnishing a chemically pure article, have multiplied. The manufacturers of blast powder machinery have been compelled to turn their attention to the new forms of apparatus.

The production of powder has forever passed out of the hands of the empiricist. More than ever will the destinies of nations depend on the skill and faithfulness of their mathematicians and chemists.

REGULATIONS FOR THE CONSTRUCTION AND USE OF TARGETS FOR FIRING INSTRUCTION IN THE GERMAN FIELD ARTILLERY.

Translated from the *Revue d'Artillerie*.

By Lieut. G. W. VAN DEUSEN, 1st U. S. Artillery.

THE question of the construction and use of targets, etc., for instruction in firing is regulated in Germany by a very detailed ministerial order, under date of February 8, 1894, which bears the above title.

In addition to a short introduction, this order is divided into four parts which are devoted to I. Figure or silhouette targets. II. Targets made by grouping single targets. III. Methods employed to represent the fire of an enemy. IV. Methods employed to represent the bursting of projectiles.

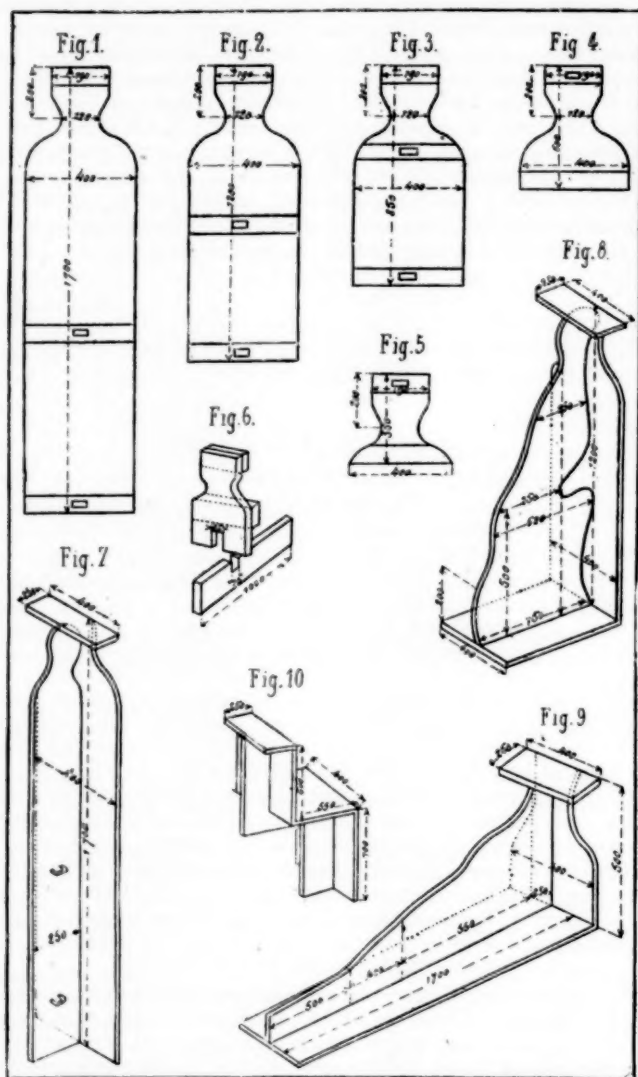
A brief résumé of this order follows, with reproductions of some of the illustrations which it contains.

INTRODUCTION.

The proper use of military targets is indispensable for the instruction of troops in firing. Such targets attain completely the object for which they are constructed only when, by their appearance as well as by the nature and rapidity of their movements, they bear a close resemblance to the objects which they are intended to represent. The officers who have control of the firing instruction are also responsible for the proper construction of the targets.

PART I. FIGURE OR SILHOUETTE TARGETS.

For fixed targets the figures are made of wood while for moving and disappearing objects, cloth and pasteboard are also used. The figures are cut out so as to have a rude resemblance to the object intended; on the side towards the batteries, the figure is painted in appropriate colors, or it may be cut out and pasted on. When time and means are wanting, it will be sufficient to cover them with a uniform coat of gray paint, marking on them, when possible, a light colored line to the top of the figure. The water colors can be prepared to resist the weather by adding to them a little glu-



INFANTRY SILHOUETTES.

and bichromate of potash. The mixing and painting should be done in the shade. The details of the figures are completed in various ways, as by tacking on pasteboard, pasting paper, etc.

For wooden silhouettes, planks from 20 to 25 cm. in width are used. The thickness should be 2 cm. or 5, if it is intended to observe the penetration of shrapnel and fragments of shell.

As a general thing, figures of single thickness are used, but in order to show properly the effect produced by projectiles, it may be necessary to use double thickness. The latter should always be used with shells with bursting charges. The figures used to represent the different arms are as follows:

INFANTRY.

Single figures.—Figures 1, 2, 3, 4, 5 represent men standing, kneeling, covered to the waist, chest and neck. These targets are made of two planks

Crête couvrante.

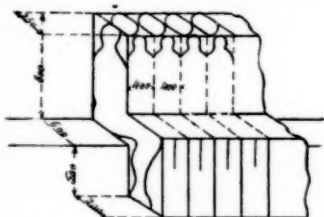


Fig. 11.

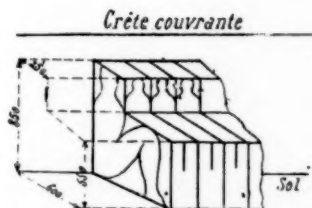


Fig. 12.

joined together by cross-pieces and provided with one or two braces or screw-rings. Each figure has an iron picket for a support. The head and chest figures can also be mounted on a plank as shown in Fig. 6.

Double figures.—Figures 7, 8, and 9 represent men standing, kneeling

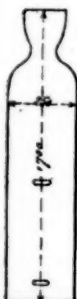


Fig. 13.



Fig. 14.

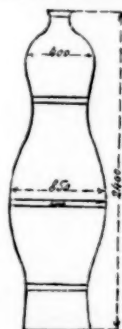


Fig. 15.



Fig. 16.

and covered to the chest. Fig. 10 represents a man sitting down. A row of men sitting on a bench is shown in Fig. 11, and sitting on the ground in Fig. 12.

CAVALRY.

The figure of a mounted man is used only for the movable cavalry target (Fig. 35).

ARTILLERY.

To the targets shown in Figures 1, 2, 7, and 8 are added the profile of a man standing (Fig. 13), kneeling (Fig. 14), the rider and horse at a halt (Figs. 15 and 16), in motion (Figs. 46 and 47), the piece (Fig. 17) and the limber or caisson (Fig. 18). These two last targets are replaced whenever practicable by condemned artillery wagons, etc.

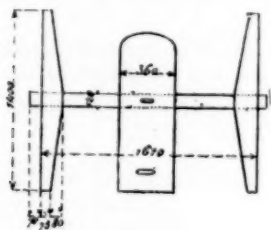


Fig. 17.

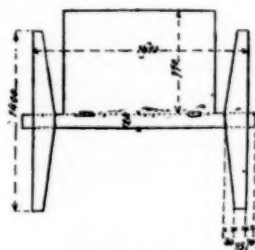


Fig. 18.

For foot or siege artillery, use is also made of a profile figure of a horse, representing a team marching by the flank. For a mounted man, the profile figure, Fig. 13, can be nailed on this last target.

PART II. GROUPS OF SINGLE FIGURES.

These targets are formed by combining several single figures.

Marking at the target is facilitated by the use of stakes of various kinds as range marks, and measuring poles to give heights.

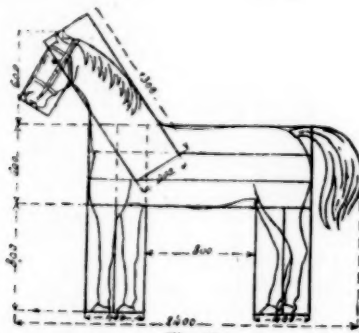


Fig. 19.

These range stakes must be so located that they cannot be used by the batteries in aiming. The measuring poles are generally used only for school or experimental firing. They are from 8 to 15 metres long and carry transverse scales every three metres. The holes in the ground for placing them are best excavated with American augers.

I. *Fixed Targets.*

Infantry.—On open ground, lines of skirmishers, formations by battalion and in column are represented by figures of men lying down. Their position should not be indicated by figures standing or kneeling to represent chiefs of sections and squads. The second ranks of close formations are only represented when it is desired to observe the effects of penetration.

Field artillery.—To represent a battery there are required:

30 figures of soldiers standing or kneeling; 18 profile figures, standing or kneeling; 6 pieces; 2 caissons.



Fig. 20.

The pieces are generally placed at the normal interval of 20 paces.

Figure 20 shows the arrangement of a battery of six pieces and two caissons. If, besides, it is desired to show the horsed limbers in rear of the pieces, there are required 41 full figures of men; 18 profile figures of men; 47 horses; 6 pieces; 6 limbers.

Fig. 21 represents a section with limbers horsed.

The arrangements shown in Figs. 20 and 21 may be modified, especially, in order to illustrate the various formations in use in foreign countries.

Foot artillery.—shown further on.



Fig. 21.

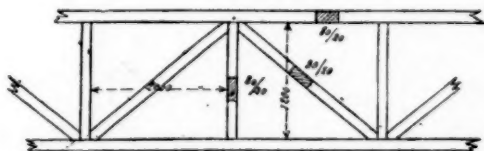


Fig. 22.

II.—*Concealed Targets.*

Folding targets are used, and sometimes lattice work targets.

Folding Targets.

Infantry.—The ordinary figures described above are securely fastened to a log or timber. To represent columns of men, the figures should first be attached to a framework of laths, which is, in turn secured to the timber, which also carries a bent lever.

When it is not desired to show the effects of penetration for different projectiles, pasteboard can be used to replace wood in the figures on account of its lightness.

The beam employed for wooden figures is shown in Fig. 23. When the

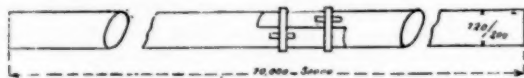


Fig. 23.

figures are of pasteboard, a smaller beam is used, and is composed of two pieces, as shown in Fig. 24.

There are two sizes of the bent levers (Fig. 25). Small wooden wedges are used to insure a close union between the timber and lever (Fig. 26).

Fig. 26 shows the appearance of a folding target representing infantry.

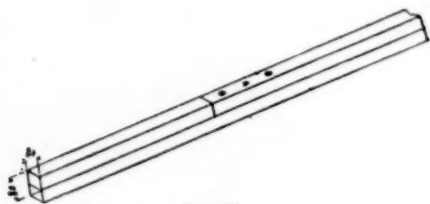


Fig. 24.

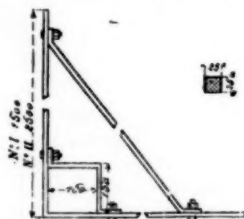


Fig. 25.

A No. 1 lever is large enough to work a beam 50 metres long supporting 70 chest figures. On poor ground it is preferable to employ several smaller timbers, all controlled by the same rope. One man can manage 400 metres of rope.

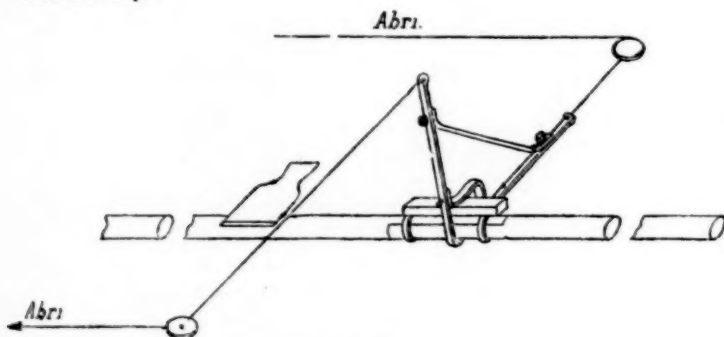


Fig. 26.

For standing or kneeling figures, shorter beams and the No. 2 lever are used.

When there is room, two or three levers may be placed on a single tim-

ber, the control of all being united in a single rope, operated from a shelter outside the space occupied by the target.

Field Artillery.—All the figures are of pasteboard, covered on both sides by a coat of oil paint to protect them from dampness.

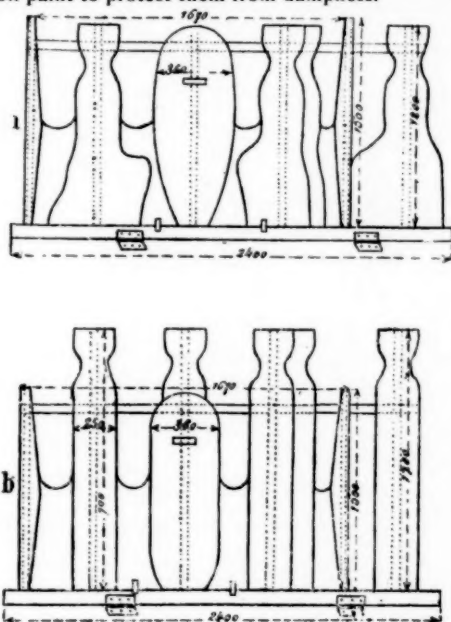


Fig. 27.

Fig. 27 represents "a."—The piece with cannoneers kneeling; "b."—The piece with cannoneers standing.

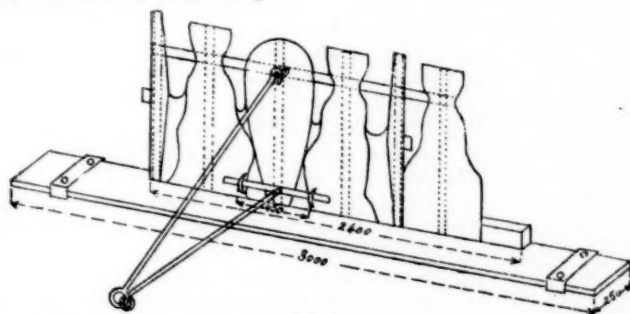


Fig. 28.

For each frame representing a piece or carriage there are required one lever; one support; one ground sill, with four stakes.

Fig. 29 shows the method of placing a folding target representing artillery. The figures representing the battery commander, trumpeter and chiefs of section are either left out entirely, attached to the nearest pieces, or operated independently.

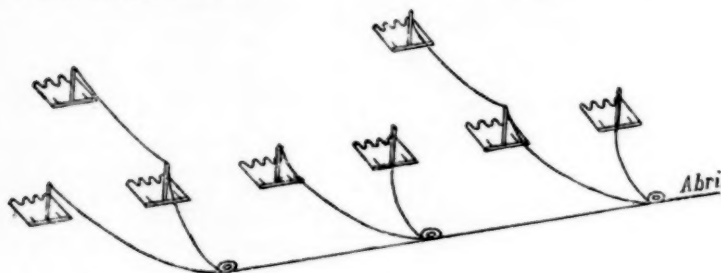


Fig. 29

All branches of the rope should be kept equally taut. A double system of pulleys must be used if—as is rarely the case—it is desired to give alternate rising and falling motion to the target. In this latter case, the caissons are generally left out.

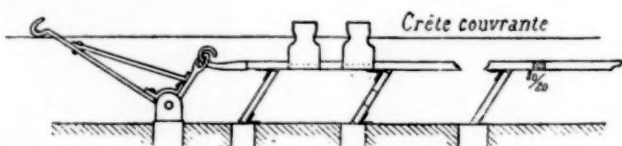


Fig. 30.

Lattice-work Targets.

These targets are used when it is wished to represent bodies of troops appearing suddenly from behind shelters, by which they have been hidden until the instant of appearance. The operating machinery should be well protected by mounds of earth, so that it will not be rendered useless in a short time.

The protection of targets of this nature for artillery is generally quite difficult, and as their construction and placing requires considerable time, they are seldom employed.

The figures are fastened securely to a horizontal slat, which is held up by jointed supports and raised or lowered by a bent lever (Fig. 31).

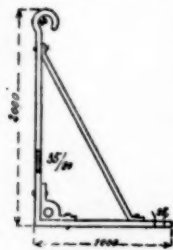


Fig. 31.

For operating there are required—a cable of iron or steel, horizontal or vertical metallic pulleys, forks to prevent the cable trailing on the ground, and a capstan to work the cable. The cable must be strong enough to support a weight of least 500 kilogrammes.

Fig. 32 represents the capstan. Two men can work it with 400 metres of cable.

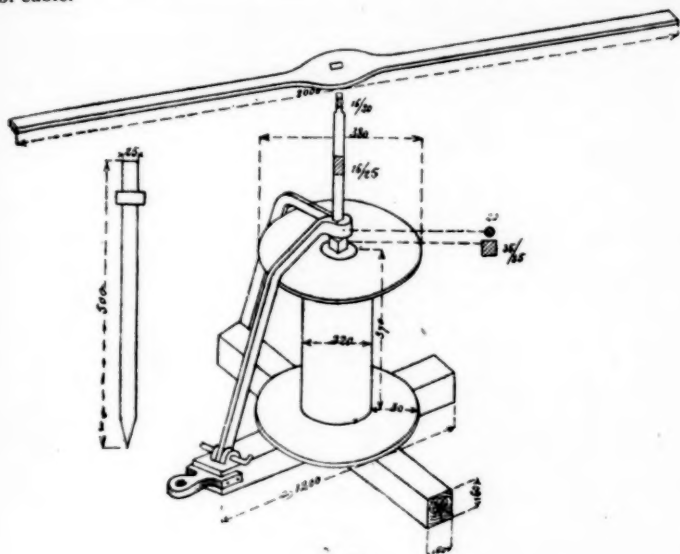


Fig. 32.

Fig. 33 shows the appearance of a lattice target representing infantry. The bent lever, turning about the vertex, is fastened to the end of the strip, near the edge of the shelter. Sliding guides insure the accurate movement of the whole in a vertical plane. The apparatus may be so arranged that

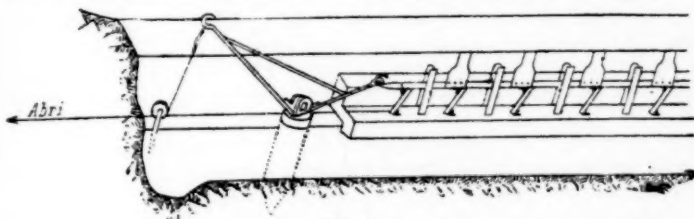


Fig. 33.

the target will disappear by its own weight as soon as the cable is slackened off.

III.—Moving Targets.

To represent moving targets, figures are fixed on frames and then mounted on trucks. They are placed in motion by long cables attached to horsed limbers or to machinery operated either mechanically or by horse power. Pulleys are used to give direction and forks prevent the cable from rubbing against the ground.

The operators should be well trained to handle these targets successfully.

They are composed of several parts, as follows :

1st. The figures.—Three kinds are used representing respectively a skirmisher (Fig. 34), a horseman (Fig. 35) and a horse (Fig. 36).

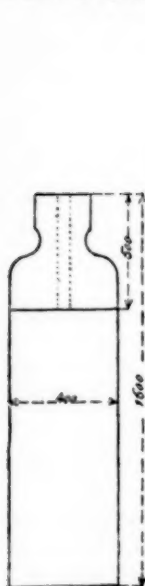


Fig. 34.

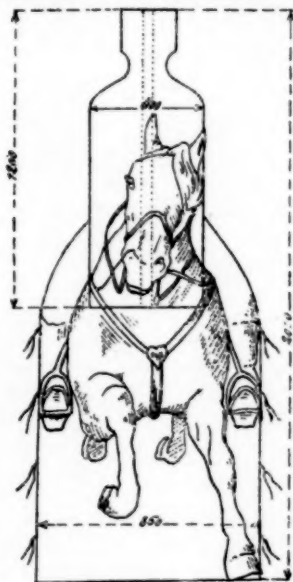


Fig. 35.



Fig. 36.

The upper part of the figure is of strong pasteboard strengthened by slats; the lower part is a framework covered with cloth or thin pasteboard. A coat of oil paint is applied to both faces. The figures of the horseman and horse have side lashings for fastening them to the frame or to each other.

2d. The frames.—They are made of slats; each frame is provided with a bent iron lever which is fastened by its short arm to the middle cross-piece in the frame.

These frames are of three kinds; infantry for 25 skirmishers (Fig. 37) ;

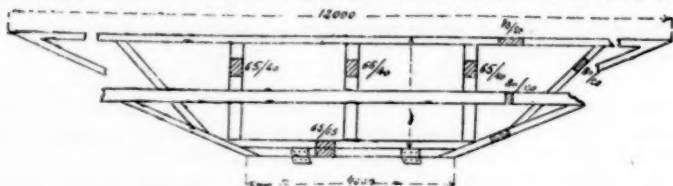


Fig. 37.

cavalry for 15 horsemen (Fig. 38); artillery for a piece with its personnel (Fig. 39). On rough grounds smaller frames are used.

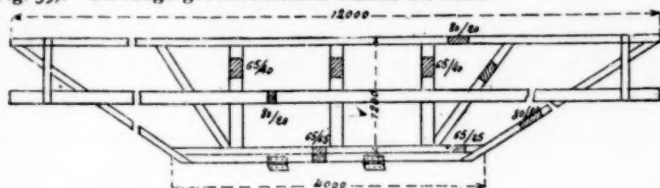


Fig. 38.

3d. Trucks.—There are two kinds of trucks,—for infantry and artillery (Fig. 40)—and for cavalry (Fig. 41). Each truck is composed of two bent iron shoes, curving up at the extremities. Fig. 42 gives the profile of the

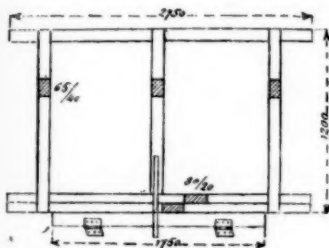


Fig. 39.

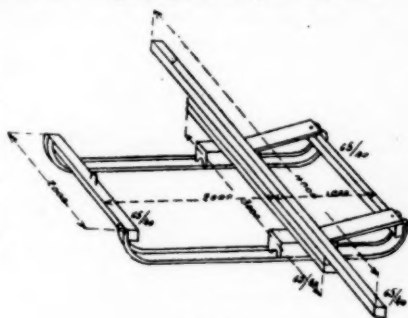


Fig. 40.

shoe. For infantry and artillery the lower part of the shoe is flat (Fig. 43); that for cavalry, curved (Fig. 44). The truck is strengthened by cross-pieces so that it cannot be pulled out of shape.

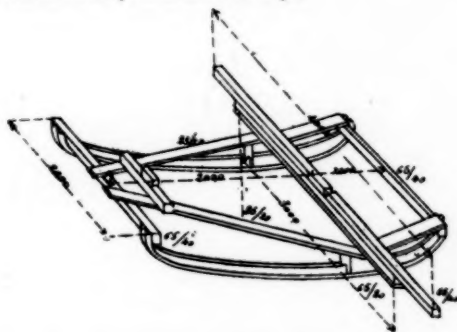


Fig. 41.

The frame is, as a general thing, joined to the truck by hinges so as to allow it to be used as a movable folding target. From two to four hinges

are used, depending upon the size of the frame. To give increased strength, the frame is lashed on one side to the truck and on the other to one arm of the lever.

4th. The cable and its accessories.—The cable should have a resistance of at least 700 kilogrammes per metre. For the infantry and artillery truck



Fig. 42.

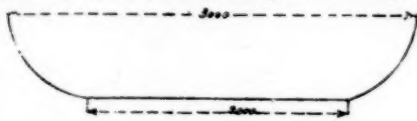


Fig. 43.

the cable should be composed of five iron strands 2 mm. in diameter; for cavalry, of four steel strands 1.4 mm. in diameter.

The cable is kept rolled on drums in lengths of 2000 metres.

The accessories comprise old style limbers arranged for transporting the cable drums, pulleys, forks, etc. Whenever limbers are not used for the



Fig. 44.

motive power, all the tools used for repairing machinery must be also carried along.

OPERATION.

Before being placed in motion, the frames are folded down; they are elevated in starting by the tension of the cable. When the start is made on very smooth ground, it may be necessary to increase the resistance to

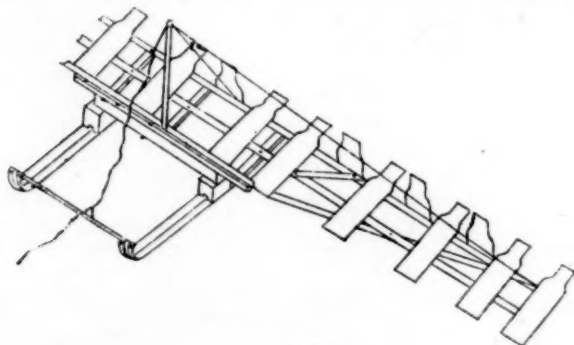


Fig. 45.

motion a little by placing some pieces of turf before the truck, so that the raising of the frame may be insured.

In the use of pulleys for changes of direction, angles below 90° must be avoided.

Figs. 45 and 46 represent various combinations of disappearing movable targets.

In Fig. 45 the standing skirmishers fold down when the motion ceases, leaving only a line of men lying down, represented by chest silhouettes nailed to a timber in rear of the truck.

In Fig. 46, when the truck is in motion, the target represents a piece with its horses. When halted, the movable frame folds and there remains a fixed frame representing a piece in battery. These results are obtained in the following manner:

The rear lashings which bind the frame to the truck are drawn tight

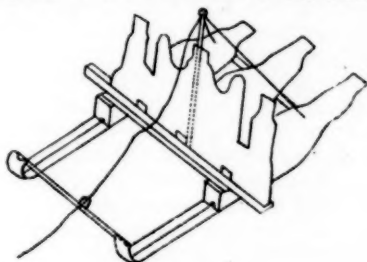


Fig. 46.

enough so that the frame when raised shall always incline slightly to the rear, thus preserving a tendency to fold when released.

As, however, the tension of the cable would be sufficient to keep the frame elevated even at a halt, the cable is joined to the lever by a hempen rope strong enough to draw the truck in its ordinary motion, but yet weak enough to be broken easily by the pull of the horses should the truck strike against some obstacle too great to be surmounted. At the place selected for the target to stop, two strong stakes are driven in the track followed by



Fig. 47.

the truck. When this strikes against the stakes, the rope is broken and the frame falls.

This arrangement is shown in Fig. 47.

IV.—Sheltered Targets.

These targets may be placed behind either natural or artificial shelters, as shelter trenches, field entrenchments, parapets, hedges, enclosures, etc. The parapets when used may be constructed either according to the rules laid down in Germany, or those of other countries. When it is simply desired to conceal the targets from sight, brushwood or painted cloth may be used.

The firing portion of the enemy is represented by single figures at inter-

vals of 1 pace (.8 metre) or in exceptional cases, at $\frac{3}{4}$ pace (.6 metre). Only the head of the figure appears above the shelter. The hidden troops are represented by figures placed so as to make allowance for the angle of defilement, which angle is measured by a rule and level. A target representing a village may be fully or only partly occupied, depending upon the kind of fire. It can be used in conjunction with shelter trenches. In the village or behind it can be massed numerous figures.

TARGETS FOR SIEGE PRACTICE.

The German order contains detailed instructions concerning these targets, such as earthworks, stone walls, iron gratings and nets, bridges, etc.

It provides also for the construction of targets representing quickly moving objects, such as troops engaged in a sortie, troops assembling, batteries in process of construction, etc.

Quite a long chapter is devoted to captive balloons, a few extracts from which will be given.

The balloon is made of cotton cloth, canvas or some other suitable material. It is rendered air-tight by a coating of varnish. It is from $2\frac{1}{2}$ to 3 metres in diameter and is furnished with cords for attaching it to the cable.

For the cable a rope is used 500 metres long and 5 mm. in diameter, able to support a weight of at least 75 k. g.

A metallic cable is also used made of four strands of galvanized steel $\frac{1}{2}$ mm. in diameter; it weighs 6.16 grammes per running metre and has a resistance to rupture of 100 k. g.

Knots of various colors are placed 25 metres apart, so that the height of the ascent may be judged.

The rope or cable is wound on a metallic drum mounted on a solid wooden base, and provided with a crank at each end.

Inflation.—These balloons are inflated with hydrogen which is furnished by the balloon corps in accumulators holding 5 mc. of the gas under a pressure of 200 atmospheres. The net cost of an accumulator with its system of valves is about 110 francs and a cubic metre of compressed gas costs 3 fr.

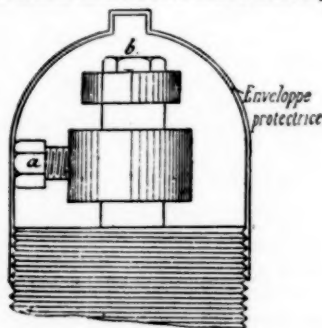


Fig. 48.

75 centimes, not including the transportation. The valve system of the accumulator is indicated by Fig. 48.

To fill the balloon, the outside envelope of the accumulator is unscrewed, then the screw "a" and the end of a tube connecting with the balloon screwed on in its place. The screw "b" is then slowly turned with a wrench, allowing the compressed gas to escape into the balloon.

TRANSPORTATION AND ASCENSION.

Four men holding on to the ropes are enough for calm weather. To prevent its accidental escape, a cord is passed through the eyelets in the bottom of the net, and this is fastened around the body of one of the men. When it is windy, two or three more are required to prevent the balloon scraping against the ground.

At the place where the balloon is to be sent up, the cable drum is placed so that the axis is at right angles to the direction of the wind. The base is firmly secured in place by wooden or iron stakes so that it cannot be upset or turned around.

During the ascension, two men manage the drum, at the cranks, while two others allow the cable to slide through their hands so as to remedy in time any defects in it. The cable is unwound evenly and without jerks in order to avoid the risk of breaking and also to prevent injury to the hands of the men who hold it.

When the balloon has reached the desired height the drum is locked by means of an iron key and the men withdraw to shelter.

If it is desired to have the balloon rise or descend during the firing, the drum is set up under cover and the cable passed over protected pulleys, lashed by flexible cords to stakes driven into the ground.

PRESERVATION AND REPAIR.

Because of the varnish, the folds of the envelope are very apt to stick together. Furthermore, it is even liable to spontaneous combustion. For these reasons it is necessary, for its preservation, to inflate it with air and suspend it in some dry and airy place. If it is not practicable to do this, the envelope should be spread out on cords stretched side by side, and the folds should be examined and shaken out frequently to prevent sticking.

PART III.

Methods employed to represent the fire of the enemy. To represent the enemy's fire, metallic petards are used.

Each year, at the commencement of the practice season, bodies of petard men are formed. For field artillery, they are selected from the workmen under the control of the commandants of the instruction camps or the officer in charge of the firing; for foot artillery the selection of the men is even more carefully made, as they are part of the personnel sent on ahead and are not changed during the entire practice season. These petard men receive special instruction from a competent non-commissioned officer of artificers under the supervision of an officer.

Infantry.—The fire of infantry targets is not generally imitated.

Artillery.—When the fire of the artillery targets is to be considered, cannon shots are represented by means of strings of petards placed in front of

the pieces in the prolongation of the axis of each piece, as shown in Fig. 49. The petard is constructed as follows: The envelope is of metal, oval in shape. At each extremity of the longer axis is a kind of neck, which gives passage to the fuse. The powder is introduced through a similar neck on the side. The charge is generally 7 grammes. The fuse is a gutta percha tube containing a burning composition, the speed of combustion being about $\frac{1}{2}$ metre per minute.

The petards are strung on this fuse like beads, their number and the distance between them depending upon the rapidity and duration of the

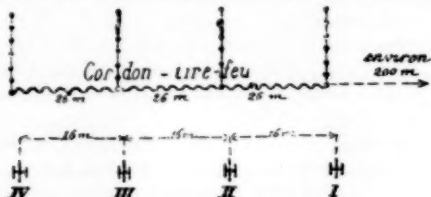


Fig. 49.

fire desired to be represented (Fig. 51). That the transmission of the flame to the charge may be insured, that portion of the fuse within each petard is pierced by a hole which allows contact between the powder and the fuse composition.

The first petard is lighted by a quick-match fastened to an iron stake, pierced with proper vents and firmly secured in the ground. This quick match is exploded from a distance by a long cord, a species of long lanyard, operated from some neighboring shelter. The lanyard may be provided with pulleys for the transmission of the motion to the match.

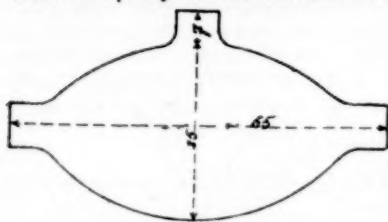


Fig. 50.

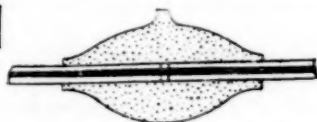


Fig. 51.

PART IV.

Methods employed to represent the Bursting of Projectiles.

Percussion shells.

Field artillery shells and common shells of foot artillery.

To represent the bursting of projectiles of these classes, petards are made by filling ordinary bags of cotton cloth or floss silk with 250 grammes of powder. There is nothing of especial interest in the mode of using these.

High Explosive Shells of Foot Artillery.

For this purpose petards are used made from peculiarly constructed cartridges.

These cartridges are pear shaped and contain in addition to a charge of 100 gr. of powder, a certain quantity of pulverized lamp-black, and are provided with a plug carrying a quick-match.

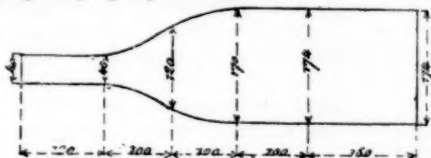


Fig. 52.

The cartridge bag is of cotton cloth or floss silk. For its construction, a rectangular piece of cloth is taken, 580 m.m. long and 638 broad, and folded in the longer direction. Then, by the aid of a pasteboard pattern—Fig. 52—placed as shown in Fig. 53, the lines "a, b, c," "d, e, f," are drawn, and two seams made along these lines. The cloth is then cut away along the lines "a', b', c'," and "d', e', f'," and the opening of this species of bot-

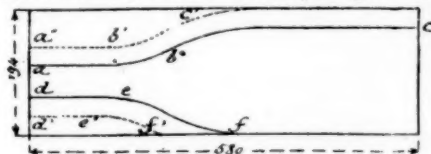


Fig. 53.

tomless bottle closed at the narrowest part by a strong string, the ends of this being fastened together to form a loop. The plug (Fig. 54) is cut from a piece of fir or spruce wood about 20 mm. square; and is fastened in the bag at the groove "a." The match is placed in the channel in the space "b"; in this position its point is engaged in the groove in "c." The portion of the plug not grooved is traversed lengthwise by a circular opening which gives passage to the flame from the match.

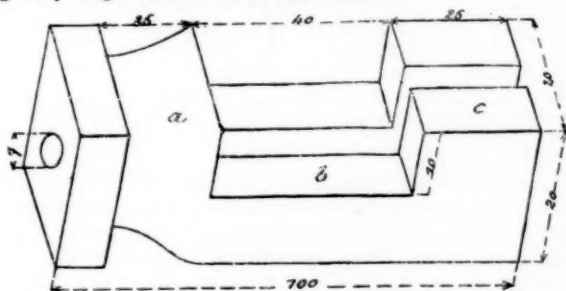


Fig. 54.

The loading is effected as follows :

The charge of 100 grammes of powder is poured into the bag through a funnel. When this charge is well shaken down, the plug is tied in the bag so that its base will be in the top of the charge of powder. The opening

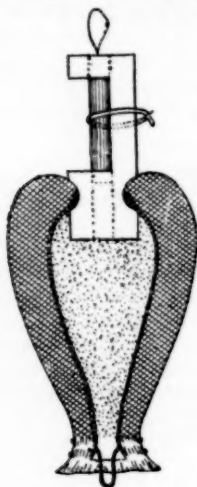


Fig. 55.

in the plug has been previously covered by a disk of strong paper to prevent the escape of the powder. The portion of the cartridge so formed is then closed by a piece of strong twine (Fig. 55). The loose cloth is then folded back on itself, forming a sort of annular pocket in which is placed about 1200 grammes of finely powdered lamp-black, and this pocket is then closed at the bottom of the cartridge, as shown in the figure.

The powdered black does not burn but mingles with the smoke at the instant of bursting and creates a thick black cloud. It should be perfectly dry, and distributed in an even manner about the charge.

For use, this cartridge is suspended by the loop to a forked stake firmly driven in the ground. The match is lighted as explained for the metallic petards.

Time shells.

Field artillery projectiles and foot artillery shrapnel.

The bursting of projectiles of these classes is represented by petards similar to those described in the preceding paragraph (Fig. 55), except that they contain no powdered black. The charge is 35 grammes of rifle powder, and they are painted black to render them less easily seen. Fig. 56 represents the arrangement adopted to insure the bursting of these petards at varying heights. It consists of a mast "A" held in a vertical position

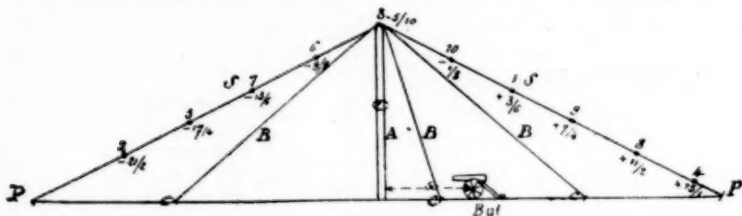


Fig. 56.

by three metal props "B," fastened to the anchoring stakes "C." From the top of the mast is stretched a metallic cable of special design, called "cable à crochets," "S," held in place by two stakes "P," and provided with hooks for hanging the petards. These are exploded by means of quick matches ignited by long lanyards. The mast is constructed of cast-iron tubes, the same as used for gaspipes. The exterior diameter of these tubes is 44

mm. and the thickness of the wall $4\frac{1}{2}$ mm. These can be purchased almost anywhere.

The mast is 10 metres high. As the tubes are not of sufficient length, two sections are united by means of a large screw-nut, the joint being strengthened by an iron rod of suitable size engaged in the tube on a level with the point of junction. At the top of the mast are three strong screw-rings which hold the props. A little below the top of the mast is a kind of window in which is placed a small pulley "c." Over this pulley passes a metal cord about 20 metres long and which is used for working the cable. At the foot of the mast is placed a catch "e" on which this cord is fastened at a certain point of the manœuvre. The mast ends in a point at the lower end.

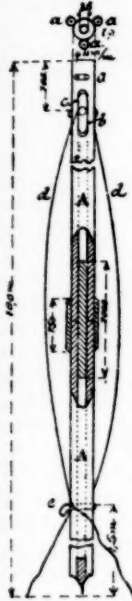


Fig. 57.

The metal supports "B" are 20 metres in length. At one end they have a hook to engage in the ring at the top of the mast. The other end is fastened to the anchoring stakes. These stakes may be of either wood or iron, depending upon the nature of the soil. This arrangement is operated in the following manner: The mast is raised and secured, the cord "a" having first been passed over the pulley. Take the cable by the middle and fasten to this point by a strong knot one end of the cord "d." Suspend the petards to the hooks of the cable by their loops, after having fixed the matches in place and engaged the hooks of the lanyards in the rings of the primers. Pull on the other end of the cord to raise the cable and petards. When it has reached the desired height, fasten the cord firmly to the catch at the foot of the mast. Then extend the cable by means of the two stakes belonging to it so that it will form a triangle with the highest point at the top of the mast.

A non-commissioned officer and five men are required to set up and operate this apparatus. The details of this operation may be changed by modifying the orientation of the cable and also the arrangement of the petards upon it. Several cables may also be used. Fig. 56 represents the case of a single cable set in the direction of the line of fire.

HIGH EXPLOSIVE SHELLS OF FOOT ARTILLERY.

The same apparatus as above is employed in this case. The petard is similar to that described for percussion shells (Fig. 55) except that it contains only 50 grammes of grained powder instead of 100, and 600 grammes of powdered black instead of 1200.

Military Notes.

THE CAVALRY ARM.

SINCE the days when Ziethen and Seidlitz contributed so brilliantly to the victories of Frederick the Great, the cavalry arm has undergone considerable vicissitude. Quarter of a century ago the conviction was all but universal that there was no longer any *métier* for cavalry on the battle-field. At every field-day, in every newspaper, the cavalry was told that its sun had set for ever; and it was little wonder that under pressure so powerful the mounted arm came to distrust its own potentialities. But under the test of actual battle the theories of the pessimists went to water; and at Mars-la-Tour the charges of Bredow's brigade and of the 1st Guard Dragoons proved triumphantly what results well-led and well-disciplined cavalry could accomplish even in the most unfavorable conditions, and against infantry still unshaken. The great fact came then to be realized, that the very intensity of the infantry struggle creates moments of crisis, when the influence of control no longer has sway, and when, in spite of the fire of breech-loading rifles, the bravest infantry, if assailed at the right moment, may be ridden over like a flock of sheep. Mars-la Tour created a revolution in the estimate of the cavalry arm held by the great powers of continental Europe. Since that memorable day they have been unanimous in the conviction that an adequate force of highly trained cavalry is absolutely indispensable to the safety and success of a modern army in the field, and they are exerting earnest and continuous effort to perfect the efficiency of their mounted arm in every detail.

The approaching cavalry manœuvres, which are to be held this year for the first time under the independent command and direction of the Inspector-General of Cavalry, may advantageously direct the attention of the country to sundry questions of great importance alike to its protective and its financial interests. It is proposed in this article to inquire whether the cavalry arm of our military service has attained and continues to maintain the standard of efficiency demanded by the requirements of modern war, and therefore justifies its existence as a very costly item in the annual army estimates. If such inquiry shall result in the demonstration that the standard of efficiency in the cavalry is below that undoubtedly attained by the other arms, it seems eminently proper to determine to what extent this is so, and to attempt to ascertain on whom rests the blame for the injury inflicted on the country in being burdened with an unduly large charge for an inferior production.

In the consideration of this subject, it may be useful to the general reader to be briefly told what is the *raison d'être* of cavalry in modern

war. Its rôle is twofold: on the march and on the battle-field. On the march its cavalry are the eyes with which an army sees, and the ears with which it hears. From the beginning of an advance the cavalry is out in its front and on its flanks, at once protecting and informing the army, which marches safely and trustingly within the screen which it affords. The information which the zeal and the forwardness of the cavalry gathers and sends in has the advantage over that furnished by spies, in that it is furnished by professional soldiers who, because of their superior intelligence and conversance with the features of war, are capable of forming an opinion as to its value. As the advance proceeds, the cavalry divisions which precede the respective armies presently come into collision; and it is the cavalry which has succeeded in defeating that of the enemy that thenceforth will achieve important successes in gaining intelligence. "Then only," in the words of Von der Goltz: "will individual officers and small detachments be able to penetrate to the enemy. A superior strength of advance-cavalry is master of the situation, the superiority not wholly consisting in numbers, but also in a just proportion of efficiency and numbers; and the weaker cavalry must accept the fate of being driven back upon its main body, to which it becomes rather an encumbrance instead of an advantage."

Valuable as are the services of the cavalry while acting as the eyes and ears of an army, its tactical duties on the battle-field are not of less importance. These may be briefly summed up as follows: To endeavor to gain the flank or rear of the enemy, with intent to gain information and create a diversion; to assist and support any movement of the other arms made with the object of outflanking the enemy; to prevent, retard, or give timely notice of any attempt of this nature made by the enemy; to push forward detachments along the roads by which reinforcements to the enemy may be expected, to give early notice of the approach of such, and to harass and impede them should they appear. It may be added that, as in the province of strategy, so in the sphere of tactics must the hostile cavalry be overthrown before any useful end can be obtained. The *raison d'être* of cavalry, then, may be shortly summed up as follows: (1) To carry out its strategic and tactical rôle as generally outlined above; and (2) to overpower and paralyze the enemy's cavalry.

The necessity to an army of to-day of a sufficiently numerous and powerful cavalry force having been thus indicated, the reader may fairly desire to ask for a definition of the characteristics which constitute a perfectly efficient cavalry. The succinct reply is, that a cavalry force may be held to possess all the necessary attributes whose men and horses are physically fit in all respects for the cavalry service—the men good riders and the horses thoroughly trained; which is equipped in the most serviceable manner; which is commanded and led by competent officers and leaders thoroughly known to their men, by whom they have been instructed and trained in peace-time, and in whom they have full confidence; which is possessed of an organization lending itself most readily to the kind of work required in war, and requiring no radical changes on mobilization; and finally, which has been thoroughly trained and instructed in all the duties it may be called upon to undertake in war by the officers who will lead and command it.

The first two of these attributes are simply the ordinary requirements of every reasonably efficient fighting body. But some comment is worth being made on the three latter, since in their fulfilment a principle is involved which is peculiar to this arm, and which is to it what fire-power is to the other arms, yet which is habitually disregarded in the preparation of our cavalry for war. It is an unquestioned fact—proved by history and testified to by leaders of experience in the most recent Continental wars—that when two cavalry forces of fairly equal strength engage, victory will certainly belong to the side which possesses the higher morale. No one who cares to picture in imagination the conditions of a cavalry combat can fail instinctively to recognize that in it this quality must exercise a far more powerful influence than in any other kind of fight. What, then, are the elements which go to constitute this morale? They are various and they are cumulative. The leader must be known and trusted by his men. The character and value of each individual man must be known to the leader by virtue of the latter's experience in the training and instruction of the former. The superior officers must be possessed of tried and acknowledged competence to command. An organization must exist which shall keep close together in action men who have been trained and instructed together in peace-time. A spirit of mutual confidence must pervade all ranks, accompanied by the highest discipline and an individual and collective resolution to conquer or die.

While a high standard of morale, engendered by a sound organization, and a careful system of training and instruction, must imbue the whole body when acting together, this thorough military education is calculated to inspire in the individual non-commissioned officer and private trooper the noble virtues of self-command and self reliance. In one of the most important duties of cavalry—the service of reconnaissance—the experience may befall a small scouting party, consisting mayhap only of a corporal and two men—nay, it may occur to one lone man—to be isolated in the midst of dangers, extrication from which can be accomplished by the acuteness, intuition, and self-reliance impressed by thorough training in peace-time. Morale in the collective body, and self-reliance in the individual, are then, the qualities which it is of paramount importance to develop and maintain in the cavalry arm, and this essential result can be attained only by the sedulous cultivation of the specific attributes which have been detailed above.—*Blackwood's Edinburgh Magazine.*

GENERALS-IN-CHIEF, U. S. ARMY.

1. General George Washington—June 15, 1775, till Dec. 23, 1783.
2. Major General Henry Knox—Dec. 23, 1783, till June 20, 1784.
3. Captain John Doughty, Artillery—June 20, 1784, till August 12, 1784.
4. Lieut. Colonel Commandant Josiah Harmer, Infantry—August 12, 1784, till March 4, 1791. Brevet Brigadier General, July 31, 1787.
5. Major General Arthur St. Clair—March 4, 1791, till March, 5, 1792.
6. Major General Anthony Wayne—March 5, 1792, till Dec. 15, 1796.
7. Brigadier General James Wilkinson—Dec. 15, 1796, till July 3, 1798.

8. Lieut. General George Washington—July 3, 1798, ill Dec. 14, 1799.
9. Major General Alexander Hamilton—Dec. 14, 1799, till June 15, 1800.
10. Brigadier General James Wilkinson—June 15, 1800, till Jan. 27, 1812.
11. Major General Henry Dearborn—Jan. 27, 1812, till June 15, 1815.
12. Major General Jacob Brown—June 15, 1815, till February 24, 1828.
13. Major General Alexander Macomb—May 28, 1828, till June 25, 1841.
14. Major General Winfield Scott—July 5, 1841, till Nov. 1, 1861, Brevet Lieut. General, March 29, 1847.
15. Major General George B. McClellan—Nov. 1, 1861, till March 11, 1862.
16. Major General Henry W. Halleck—July 23, 1862, till March 12, 1864.
17. Lieut. General Ulysses S. Grant—March 12, 1864, till March 4, 1869.
18. General William T. Sherman—March 5, 1869, till Nov. 1, 1883.
19. Lieut. General Philip H. Sheridan—Nov. 1, 1883, till August 5, 1888.
20. Major General John M. Schofield—August 14, 1888, till Sept. 29, 1895.
21. Lieut. General, Feb. 5, 1895.
21. Major General Nelson A. Miles—October 5, 1895.

—COLONEL ROBT. H. HALL, 4th Infantry.

TESTING THE NEW MAXIM GUN.

It is a much disputed point whether the inventor of an effective instrument of a war is a benefactor or an enemy of mankind. It is true, however, that the final perfection of the science of killing means the end of war. Among the engines of destruction the Maxim gun holds the foremost place. The little instrument, which resembles a toy, weighs but 25 pounds, so that a regiment of infantry could be equipped with them. A thousand men could each fire 600 shots per minute, so that the entire regiment could fire 36,000,000 shots per hour, each bullet being capable of piercing 40 inches of oak. If even a small percentage of the bullets did their deadly work, war on a large scale, would be impossible and armies would cease to meet. The cost of an hour's shooting with Maxim guns would be \$1,440,000 for a regiment. The Maxim gun was first fired in the Sierra Leone campaign by Sir Francis de Winter. It was also used by Henry M. Stanley in his travels. The total weight of the gun has not been less than 40 pounds heretofore.

A very successful test of the new Maxim gun for the use of infantry took place at the Sandy Hook Proving Ground June 8, before the Ordnance Board, under the direction of James Huber, the expert of the Maxim-Nordenfellt Company. The result of the test was eminently satisfactory in every way, and it is likely that the board will advise the Government to buy some of the guns. The test was largely a matter of form, as the gun has been adopted for a long time in other countries, though not in the improved form which was exhibited. The gun weighed 25 pounds or 45

pounds when packed in its case with additional parts of the mechanism. In action it is mounted upon a tripod and consists of a single barrel attached to a metallic box which contains the rather complicated machinery. The ammunition is 0.303 calibre and is fed to the gun by belts which hold 100 cartridges each. The bullets are propelled by 38 grains of smokeless powder. The cartridges are exploded by a trigger arranged in a handle similar to that of an ordinary revolver. As long as the trigger is held back the gun will fire automatically as long as ammunition is supplied. When the trigger is released the firing ceases. The maximum number of shots which can be fired is 650 per minute. In continuous automatic rapid firing the gun would last for 50,000 rounds at the rate of 600 per minute. In the heavier guns the barrel is cooled by water, but this is not feasible in the light infantry gun. Of course this high rate of speed in the light guns could not be kept up for any great length of time without renewing some of the parts. The gun is entirely automatic in its action after the first shot has been fired. The recoil from the exploded cartridge gives the barrel, which has a rear attachment, a backward motion. The recoiling motion is limited to about an inch, as a crank comes in contact with the breech casing, causing it to rotate and strike a buffer spring which returns it into firing position. A crank also works the breech lock. The cartridges are fed into the gun by means of the belt which passes through feed blocks. The recoil of the barrel from the discharge of the first cartridge inserts the next charge from the belt, raises the breech lock, cocks the hammer and fires, extracts and ejects the shells while the succeeding charge is being brought into position.

The test began by general firing at a flag 500 yards distant, the test being for rapidity and not accuracy. Single and bunch shots were made and then a volley of 50 shots were made in 54.5 seconds. The expert was the only person who could make the gun fire one shot and stop. The next test was to determine the time necessary to unlimber the gun and get it into action. In less than 58 seconds from the giving of the word of command the expert had the gun in position and was firing at the rate of 500 shots per minute. The report from the gun is neither very loud nor very sharp, but when a number of shots are fired in rapid succession the noise is continuous and even the members of the Ordnance Board found it necessary to put cotton in their ears. The next test was to determine the time required to take apart the firing mechanism and insert the extra set carried in a knapsack. It was found to be 26.25 seconds. Changing the barrel between two shots took 1 minute 12½ seconds. The other tests were made with blank cartridges and with good cartridges mixed with bad ones. The object of this was to determine whether the gun would eject the bad cartridges and prevent them from stopping the firing. The turning of a small lever quickly removed the dead cartridge and the firing was not disturbed. In a few days the gun will be tested for accuracy, speed and range.

The gun will prove of special value in a mountainous country, where a few guns well placed would wipe out an army. One hundred men armed with the gun could mow down ten thousand cavalymen with ease. The possibilities of the machine seem unlimited and its effectiveness is well

summed up by a military man who witnessed the test. "It is the most deadly instrument of war I have ever seen. I have been told it was only a toy, whereas the accuracy and reliability are simply appalling." Each bullet will pierce the body of six men and its muzzle can be moved like the end of a garden hose.—*The Scientific American*.

GERMAN SOLDIERS ON THE MARCH.

In connection with the recent manoeuvres of the German army, in which 104,000 men have been engaged, a description (says a special correspondent of the *St. James Gazette*) of an infantry regiment on the march may not be without interest.

Directly we left the village, where the night had been spent, the order to march at ease is given; the soldiers loosen their things and carry their rifles slung first on one shoulder then on another, with the sling in front and the barrel pointing to the rear. It promises to be a hot day; not a breath of wind; the sun has just broken through and driven away a gray mist. The pace for the first three-quarters of an hour is slow, not more than three miles an hour; there is little smoking, and hardly any talking. The men adapt their formations to the nature of the ground; the road in the centre is heavy and sandy soil; on either side a firm path is to be found admitting of two men abreast, the section of fours separate; at times the section stretches in extended order the whole width of the road, at others three men abreast, the fourth man on a narrow path where there is only room for one. A large field with firm going is made use of to march the whole battalion across it. Towards the end of the first hour a man starts up a song, the whole joining in; the rifles are now slung around the neck, the sling coming far down, the barrel pointing to the rear. Whenever men marching sling their rifles, they invariably hold the sling with one hand in order to keep the rifle steady. Some regiments in the German army still march at the slope. The pace is now increased until it nearly reaches four miles an hour. At 8 A. M. a halt is made, the men pile arms, take off their accoutrements, drink some cold coffee out of their water-bottles, and eat a slice of bread and butter, which they have brought in their canteens.

The infantry of the German army nearly all wear dark blue; the cloth is thick and stands wear well. Each man carries 150 rounds of ammunition in three black leathern pouches, which are fastened on to the belt, ninety rounds in a large pouch at the back, and thirty rounds on either side. The knapsack is worn high up on the shoulders, and fastened by two black eather braces, which pass over the shoulders, and are attached in front with a metal hook to the belt. The knapsack contains one pair of boots, the white drill suit—drill trousers are sometimes worn on the line of march—three pairs of socks or fuzlappen, a fatigue cap, three sticks, strings and wooden pegs for the tent, a brush, comb and soap, a forage cap, one tin of preserved meat (which is only opened when in bivouac); the great coat and waterproof sheet for the tent are strapped across the top of the knapsack; a large canteen is fastened up near the top of the knapsack. Half the men of the company carry spades, worn on the left side, with brown leather covering to protect the blades. There are six axes and four picks to each

company, and the men take it in turn to carry these tools. The water-bottle, in a brown leather case, is attached by a short leather strap to the belt, and is worn on the right side; a brown canvas haversack is slung across the left shoulder. The total weight now carried by an infantry soldier is 52 lbs. The infantry wear Wellington boots, with very broad toes; the trousers are tucked into the boot; the upper part of the boot is sufficiently loose to give ventilation.

At 9 A. M. the battalion falls in again, and in spite of the heat the men are soon marching at the rate of nearly four miles an hour. After an hour and a quarter's march we approach the village of Passon. A soldier meets each company and hands the captain the billeting papers. The staff have arranged long beforehand how many men can be billeted on the village. A non-commissioned officer and two men from each company are sent to the village the day before. The mayor furnishes them with the names of the inhabitants and the number of men they can provide for. An officer in the village supervises the distribution. Arriving at the village, the order to march at "Attention" is given. There is little fatigue in the step which accompanies the inspiring air played by the band. With hardly any delay every man finds his way to his quarters, the heavy clothes are taken off, the non-commissioned officer of a *caporalschaft*—consisting of about sixteen men—sees to the feet of the men; socks are worn by some; others have a square piece of flannel cloth, which they bind around the feet.

POWDER TRIALS.

Records of a trial made by the *Field* of cordite, ballistite, walsrode, and cannonite powders in the Lee-Metford .303 rifle were published in that journal in June last and in its issue of the 19th ult. It also gave the result of a trial it has made of normal powder with some loaded cartridges, for the .303 rifle, sent to it for trial. They contained 32 grains of the explosive (which is straw-colored, and of the leaflet class), with the English regulation bullet of 215 grains weight. The results obtained were as follows:

	Pressure, in Tons per square inch.				Average.
	14.75	14.25	17.00	17.25	1600=15.98
Six rounds.... 16.60					
	Muzzle Velocity, in feet per second.				
	2,661	2,027	2,067	2,075	2,040=2.054
Six rounds.... 2,082					
	Recoil in foot-pounds.				
	10.6	10.1	10.5	10.5	10.2=10.5
Six rounds.... 10.9					

The weight of the rifle was $8\frac{1}{2}$ lbs. The recoil was taken simultaneously with the velocity; but the internal pressure in the chamber (as ascertained by the crusher-gauge) had to be taken with a separate series of rounds. The normal powder the *Field* found to be very clean; the bore of the rifle remaining practically unsoiled after any number of shots had been fired.

It should be borne in mind that trials carried out on different days frequently produce some slight variations in results, but to enable our readers the better to judge of the comparative merits of the different powders, we take the average results of the several trials, which are as follows:

	Charge of Powder.	Weight of Bullet.	Muzzle Velocity in feet per second.	Pressure in Tons per square inch.	Recoil in foot-pounds.
Normal Powder...	32 grains	215 grains.	2,054 feet.	15.98	10.5
Cordite.....	30 "	" "	2,048 "	16.24	10.9
Ballistite.....	32 "	" "	2,049 "	15.17	11.1
Walsrode.....	35 "	" "	2,021 "	22.11	10.2
Walsrode.....	35 "	200 "	2,085 "	19.43	10.4
Cannonite.....	37 "	" "	2,090 "	25.87	9.9

Rifleite, the *Field* has been informed, gives, with a velocity of rather over 2000 feet per second a pressure of over 18 tons per square inch. Black powder, the *Field* states, is practically obsolete—velocity 1850 feet per second, pressure 18 tons per square inch. From this comparison it would seem that normal powder is the only powder in England (with the exception of the nitro-glycerine powders—cordite and ballistite) that with a velocity of over 2000 feet gives a pressure of less than 16 tons, all the others giving much higher pressures.—*The United Service Gazette*.

EXPERIMENTS WITH THE LEE-METFORD RIFLE.

With a view of ascertaining the penetrating power of the Lee-Metford rifle and cordite ammunition with greater preciseness than was previously known, an elaborate series of experiments has just been concluded at the Royal Military College. The experiments were conducted on two days. Eighteen different targets were used, and the results are, remarks the *Morning Post*, of a most interesting character. Fired at a wicker gabion filled with wet sand, on both days the bullet went clean through and was lost. The next target was a solid wall of sandbags. On the first day the bullet penetrated 28 inches and then lodged. On the second day the penetration was 30 inches. It is curious to observe that the path of these bullets was never straight. In the 30 inches penetration the bullet went straight for 20 inches, then turned at right angles for 8 inches, and afterwards, again at right angles, in the direction of the firing point, where it was found undeformed. A target of loose sand was then tried. On the first day the bullet passed through 3 feet, and was then lost. On the second the target was deepened by a foot, and on this occasion also the bullet passed through and was not afterwards seen, thus giving an inconclusive result. A mound of loose shingle of 1½ inch gauge proved a most formidable objective. On the first day a 4-inch special bullet was used, and this was found broken into shavings. On the second a 6-inch bullet was used and broken up fine by the impact.

A severe test was one against a matchboard wall, the sides of which were 3 inches apart and filled with shingle varying from ¾-inch to 1½-inch gauge. In the first experiment the bullet just got through, and in the second it went right through. In a similar experiment to the last, but with the sides of the wall 4½-inches apart, on the first trial the bullet failed to penetrate, but on the second occasion it lodged in the back board, just starting it. The next experiment was against a matchboard wall with sides

apart as in the last, but filled entirely with shingle of $\frac{1}{2}$ -inch gauge, and on both days the bullet passed through. In a subsequent trial with a 6-inch matchboard wall, filled with shingle of $\frac{1}{2}$ -inch gauge, on the first day the bullet failed to get through, but on the second it lodged in the back board. Against a matchboard wall, the sides of which were $4\frac{1}{2}$ -inches apart, and filled with shingle of $1\frac{1}{2}$ -inch gauge, on the first occasion the bullet just failed to get through, but on the second the penetration was complete. With walls 6-inches apart and shingle of a similar gauge to the last the bullet failed to go through on both occasions, but on the last it penetrated 5 inches. Shooting at fir-tree logs on one day 27 inches thick, and on the next 37 inches, the bullet passed through and was lost in both instances. Oak logs proved less vulnerable. In the first experiment the bullet passed through 16 inches and was lost. In the second, however, the target consisted of two trees, each 12 inches in diameter, placed one behind the other. The bullet penetrated 20 inches, going straight through the centre of the first, and on entering the second turned sharply to the right at about an angle of 120 deg., traversing another 8 inches of oak, where it was found undeformed. Firing against a stockade of 56 lb. steel rails on both days it was found that the section of rail against which the bullet impinged was dented.

Some extremely interesting data accrued from the experiments against brick walls. On the first day the objective in each case was composed of soft brick, and on the second of hard, built up in various formations and thicknesses. To take the soft brick walls first. Against a 14-inch wall-stretcher brick the bullet penetrated $3\frac{1}{2}$ inches; against a wall of similar thickness header-brick the penetration was 5 inches; against a 9 inch wall-stretcher brick the penetration was four inches, and against a wall of the same thickness header brick it was 5 inches. Against hard brick, laid as the soft kind were, the penetration was, in the case of the thicker walls 3 inches and $2\frac{1}{4}$ inches respectively, and in that of the thinner walls the penetration was exactly as against the former. Fired against a $\frac{1}{2}$ -inch steel plate, the bullet punched a clean hole on both days. In the experiments against the brick walls the range was 12 yards, in the remainder it was 20 yards.—*The United Service Gazette.*

MAXIM'S PROCESS FOR SOLID STEEL GUNS.

Mr. Hiram S. Maxim, writing to the *Engineer*, London, says:

Fifteen or twenty years ago large forgings of steel were not always reliable; but, thanks to the recent improvements both in the process of melting and in the pressing of steel into shape by hydraulic pressure, it is now possible to obtain perfectly sound forgings of any size that may be required. In fact, I was informed by Messrs. Vickers, Sons & Company that they would guarantee to furnish a forging of a gun, all in one piece, weighing as much as 150 or 175 tons, provided it should be ordered of them, and they were willing to guarantee that every particle of the steel would be sound. It will be remembered that during the American Civil War the American cast-iron guns made on the Rodman plan were very much superior to those made in Europe; in fact, the Rodman guns, which were

cast hollow and cooled from the inside, had every molecule of the metal pulling in the right direction. The inside of these guns was in a high state of compression and the outside in a state of tension. The consequence was that these cheap cast-iron guns were quite equal to the wrought iron and steel guns which were made in Europe at the same time; and the fact that this was not altogether due to the superiority of the American cast iron is witnessed by the fact that two guns were made in the States, one cast solid in the same manner that English cast-iron guns were made at that time, and the other cast hollow and cooled from the inside. They were both out of the same lot of metal, and it was found on firing that the gun made on the English plan showed signs of distress at the first discharge, and burst at the third discharge, while the American gun was fired 1000 rounds without any signs of distress at all.

Believing that this same principle could be applied to steel guns, I erected a very large and expensive tempering plant at Erith. The first guns treated were 45 pounders, having a bore of 5.7 inches. The forgings were obtained from Messrs. Vickers, Sons & Company, of Sheffield, and were of a steel which had sufficient carbon to receive a spring temper. The forgings are first rough bored, and turned approximately into shape; they are then mounted in a furnace, and while rotating were heated to a dull red and allowed to cool slowly in the furnace. This process of annealing removed all the internal strains in the steel. The gun was then put in a lathe, turned down to very nearly the correct size on the outside, smooth bored, and rifled. It was then again mounted in the furnace in a vertical position, and while it was rotating in the furnace a current of coal gas was allowed to pass through the bore. The coal gas, of course, expelled all the air, and at the same time a small portion of the carbon contained in the coal gas was set free by the high temperature, and while in a nascent state combined with the interior of the gun, thus raising the quality of the steel and making it considerably harder.

When the gun was red-hot the coal gas was shut off, and a very large stream of cold oil under a high pressure was forced through the bore with compressed air, while the gun was still revolving in the furnace. The result was that the inside was very quickly cooled without decomposing more than half a pint of oil, and the inside being cooled, the outside gradually shrunk upon it, so that when the gun was taken from the furnace it was found that the outside was in a very high state of tension, while the inside had been compressed about 0.02 of an inch. The careful treatment which the gun had received prevented it from bending; in fact, only a very slight deviation could be found in one of the guns, while another of the first two that were made was completely straight. In both cases the amount of distortion, so far as straightness is concerned, was extremely small. The guns were then lapped out until the bore was straight inside, it having shrunk more at the breech end than at the muzzle, and fired with increasing charges. With a short and rather small cartridge case, and a long and heavy projectile—45 pounds—a muzzle velocity of 2200 feet was obtained, with a pressure of 15 tons to the square inch, but the proof charges were run up to 22½ tons per square inch.

One of the guns was not changed in the least by the firing, while the other was found to be 0.002 of an inch smaller at the breech end after the firing than before, showing that before firing the inside must have been in a very high state of compression, and the outside in a high state of tension, and that the enormous strain was sufficient when assisted by the shock of discharge to compress still more the inside layer of steel in the bore. This I think to be quite uncommon. I do not know of any authentic case where a gun fired at very high pressure has been found to be smaller after firing than before. As a rule, they all get larger by firing proof charges. Anyhow, the fact that the gun did get smaller shows that the strain set up by 22½ tons was not sufficient to put a permanent set into any portion of the gun.

I do not hesitate to say that these guns are the best that have ever been made, everything considered, and I do not hesitate to say that guns can be made on this plan which will be quite as reliable as they would be if they were made of innumerable pieces, one shrunk upon the other. This means that a gun may be made with half the weight of steel, half the time, and at half the expense as heretofore, and I do not see any reason why it should not be applied to the largest guns in the service.

MILITARY ORGANIZATION.

Col. J. F. Maurice, C. B., read a paper the other day on the above subject before the members of the Essex Infantry Brigade Tactical Society.

Col. Maurice said that he had been somewhat concerned in choosing a title for his address, for the term military organization was most generally used when dealing with the great concerns of army corps and divisions, but there was a military organization which more closely concerned the ordinary daily life of officers. A thousand men were not a regiment, and a hundred thousand not an army, and the things of importance were those which brought either number of men together as one body. There was no course of instruction which would give this knowledge; it had to be picked up by experience; but still there were certain principles upon which it was well to proceed. There were many things in regard to discipline and organization which belonged to civil as well as to military life. Organization was to a large extent a thing of the present century, which had witnessed the formation of the great shipping and railway companies and other great industrial systems, and the same principles of organization as applied to these applied also to military organization. What he wished to say on that occasion would be grouped under a few heads, and the first of these he would term the habit of command. What was the reason that one man's word of command was instinctively obeyed, and another was not obeyed in the same manner? The former gave his order as performing the duty of the moment, while the other gave his as though not quite liking to assume authority over men. Hence there was in the voice the indication of a spirit of apology or the tone of dictation. Young officers must get into their minds the idea that they gave commands merely because it is their duty to do so, and sink all personal feeling. One officer spoke as though he expected to be obeyed, another as if he hoped to be, and to attain the former

and lose the spirit they should impress upon men off parade that it was as much obedience to discipline for officers to give orders as for men to obey them. In an officer authority, responsibility, and knowledge must go together; and the officer who knew that he was giving right orders would have confidence that he would be obeyed. Then there was the chain of command, a much abused term, and as much abused at times in the Regular service as amongst the Volunteers. What was important here Col. Maurice thought might best be appreciated by an instance, in which he used a battery of artillery as an illustration. Say he himself was going the rounds in company with a lieutenant-colonel, and saw a man with a horse not properly groomed. He would draw the lieutenant-colonel's attention to it, and, following the chain of command, the lieutenant-colonel would carry the matter on to the major of the battery, the latter to the subaltern, the subaltern to the sergeant, the sergeant to the corporal, the corporal to the bombardier, and the bombardier to the man. It would have been much easier for the lieutenant-colonel to have himself spoken to the man before him; he would, no doubt, have got the horse put right, but at the cost of dislocating the whole chain of command. He would have let the major know that he would not trouble him, nor trouble him to trouble the subaltern, and so on, instead of keeping all on the alert for duty. The thing of which it was necessary to be careful was the effect to be produced in the 23 out of the 24 hours in which one was not going the rounds, not the immediate effect to be produced in the one hour. A superior officer, too, must not lower the work of subordinates by making excuses for things which go wrong; effective discipline was produced more by detection of faults than by severity of punishment. Moreover, if a superior officer let his subordinates know that he was going to do their work for them by directly dealing with a man in fault, the man was much more likely to be in fault, risking the chance of being detected by one eye only, when he knew he was not being watched by many eyes. Officers should cultivate a spirit of frankness in their men, even accepting any excuse for deficiency voluntarily acknowledged whilst a man's pack was on his back, but none for a deficiency exposed after the pack had been taken down; though of course here there must be test cases. There must always be distinct sphere of responsibility. For any duty one person must always be responsible, not half-a-dozen; and the responsibility must be perfectly clear and distinct, for which reason in barracks and rooms units should be kept as clear as possible from others. Then there was the matter of instruction. Frequently in a school the head master devoted himself to the highest form; but the colonel had in his eye a school, and a very successful one, in which the head master personally took in hand boys when they first came to school, leaving the higher classes to assisting masters. Thus he taught his new boys how to learn; and similarly officers should know their men from the beginning, in their recruit days, and make sure they were properly taught. The things to which he had referred, Col. Maurice felt must appeal to the experience of his audience, especially those who were in any way familiar with great civil concerns. He had recently been told by a man who was regarded as a great civil organizer that the first thing he always wanted to do was to make

every man under him feel comfortable, as this was the best thing for shareholders; and officers must make men feel that observance of discipline and performance of duty was the best thing for them as well as for the country.

In response to an expression of thanks for his address, Col. Maurice said the Regular service had much reason to thank the Volunteers, who were not only necessary for the defense of the country but had set an excellent example of discipline and patriotism.—*Army and Navy Gazette*.

THE BRITISH ARMY.

The general annual returns of the British army for 1894 have just been issued in the form of a Parliamentary paper.

Taken month by month, the average strength of the army, English and Colonial, excluding the native Indian forces, was 219,121 of all arms. The composition was as follows: Household Cavalry, 1315; Cavalry of the Line, 18,265; Royal Horse Artillery, 3818; Field Artillery, 14,417; Mountain Artillery, 1433; Garrison Artillery, 17,440; Royal Engineers, 7480; Foot Guards, 5994; Infantry of the Line (including Army Pay Corps), 136,665; Colonial Corps, 5073; Army Service Corps, 3527; Ordnance Store Corps, 858; Corps of Armourers, 315; Medical Staff Corps, 2521. These figures include all ranks. The monthly returns show but little fluctuation. The lowest strength was in June, when it was 216,686, and the highest in November, the figures in that month being 222,206. The average strength by ranks during the year was 7679 officers, 883 warrant officers, 13,733 sergeants, 3412 trumpeters, drummers and buglers, and 193,414 rank and file. The average distribution of these effectives forms an interesting portion of the return. Of the cavalry, 344 officers, 28 warrant officers and 7979 men were stationed in England and Wales; 24 officers, 2 warrant officers, and 434 men in Scotland; and 139 officers, 12 warrant officers, and 3399 men in Ireland—a total at home of 507 officers, 42 warrant officers, and 11,812 men. Of the same arm 46 officers, 4 warrant officers, and 1041 men were in the Colonies and Egypt; and 250 officers, 17 warrant officers, and 5861 men in India—which makes a total of 296 officers, 21 warrant officers, and 6902 men serving abroad. Of the Royal Artillery (all branches) 530 officers, 65 warrant officers, and 15,139 men were in England and Wales; 14 officers, 2 warrant officers, and 326 men in Scotland; and 65 officers, 4 warrant officers, and 1746 men in Ireland—a total of 609 officers, 71 warrant officers, and 17,211 men at home stations. In the same service 228 officers, 26 warrant officers, and 5136 men were in the Colonies and Egypt; and 488 officers, 13 warrant officers, and 13,326 men in India—a total of 716 officers, 39 warrant officers, and 18,462 men serving abroad. The figures with regard to the Royal Engineers are peculiar in the light of the disproportionate number of officers and men, compared as of the former and the latter serving at home and abroad, and showing inferentially the number of staff appointments, many of them more civil than military, which are held, particularly abroad, by officers of this corps. The return gives 418 officers, 73 warrant officers, and 4268 men in England and Wales; 10 officers, 8 warrant officers, and 87 men in Scotland; and 41 officers, 8 warrant officers, and 510 men in Ireland—or a total of 469 officers, 89 warrant officers, and

4865 men at home. In the Colonies and Egypt there were 125 officers, 13 warrant officers, and 1578 men, and in India 338 officers and 3 men; a total of 463 officers, 13 warrant officers, and 1581 men abroad. The distribution of the infantry works out as follows:—In England and Wales, 1551 officers, 287 warrant officers, and 44,865 men; in Scotland, 99 officers, 20 warrant officers, and 2698 men; in Ireland, 673 officers, 91 warrant officers, and 19,790 men—a total of 2323 officers, 398 warrant officers, and 67,353 men. Serving in the Colonies and Egypt were 827 officers, 107 warrant officers, and 28,088 men; in India 1469 officers, 103 warrant officers, and 82,373 men—a total serving abroad of 2296 officers, 210 warrant officers, and 110,461 men. Of all other arms, 2843 officers, 453 warrant officers, and 72,251 men were in England and Wales; 147 officers, 32 warrant officers and 3545 men in Scotland; in Ireland 918 officers, 115 warrant officers, and 25,445 men—a total at home of 3908 officers, 600 warrant officers, and 101,241 men. In the Colonies and Egypt there were 1226 officers, 150 warrant officers, and 35,843 men; in India 2545 officers, 133 warrant officers, and 73,475 men—a total abroad of 3771 officers, 283 warrant officers, and 109,318 men.

The effective strength of the army on January 1 of this year was eminently satisfactory. It was 196,185, or 4395 in excess of the total regular establishment. In only six branches were men "wanting to complete," while in nine supernumeraries were borne. The average strength of the army in England, Scotland, Ireland, and abroad last year was larger than in any previous year—viz., 219,121 of all ranks. In 1893 it was 217,279.

In the year under notice the total increase of non-commissioned officers and men was 36,657, and the decrease 33,965. The figures show a net increase of 2692. Of the items shown as contributing to the decrease are 3152 men discharged as invalids, 171 on conviction of making a false declaration on attestation, 1792 for misconduct, 405 as not likely to become efficient soldiers, 3958 struck off as deserters, 1236 by purchase, and 76 given up as deserters. The total number of recruits who were finally approved and added to the strength was 33,441. The recruiting tables show that 23,352 persons enlisted at ages ranging from "under seventeen years" to "nineteen and under twenty years," and 10,325 from "twenty and under twenty-one years" to "twenty-five years and upwards," in addition to which are twenty-one whose ages are "not reported."

The tables of reëngagements and extensions of service during the year disclose that of all arms 2542 men reëngaged while serving, and that 3730 men enlisted for short service voluntarily applied to be reëngaged for twelve years and 790 for other extended periods. The transfers of men on completion of the various short periods for which they enlisted to the first-class army reserve were 16,229. The number of recruits who were enrolled during the year for both long and short service was 33,698, as compared with 35,195 in 1893, 41,658 in 1892, 36,003 in 1891, and 31,407 in 1890. Of the desertions in 1894, 1032 were of men of under three months' service, 577 of three to six months, 843 of six to twelve months, 920 of one to two years, 583 over two years, and three whose length of service is not stated. The proportion of net loss from desertion per 1000 men in the period under notice was 10. It is satisfactory, however, to note, as illustrating the attrac-

tion the army has for men who have once joined it, that with a much larger number in the ranks the net loss from desertion was last year far less than in any year since 1887. The number of men tried by court-martial in all the branches of the service serving at home in 1894 was 5904. The number of cases of drunkenness in which fines were inflicted was 6036, and the number of summary and minor punishments imposed 108,205, or a percentage of 107 to the average strength.

In the section of the return detailing the rewards and services of the non-commissioned ranks and privates, it is shown that on January 1 last 521 men who were still serving in Great Britain were in the possession of medals and in the receipt of gratuities, and 538 held medals but received no gratuity. The number of men serving at home on the same date who were in possession of good-conduct badges was 33,734. The army reserve numbered 82,947, the militia 121,667, the Yeomanry cavalry 10,014, and the Volunteers 231,328—total 445,956, exclusive of 31,313 militia reserve, showing that 46,061 are required to complete the reserve establishment of 492,017. Of this deficiency the Volunteers accounted for 29,827, and the militia 13,172, the Yeomanry cavalry 1559, and the army reserve 1503.

The total of horses and mules in the army as this year opened was 26,916, and the average last year 27,207, of whom 14,712 were on the British and 12,495 on the Indian establishment.—*The United Service Gazette*.

THE EFFECTIVE OF GERMAN ARMY FOR 1895-96.

The effective of the German army is fixed for the year 1895-96 as follows: 22,618 officers, 17,981 non-commissioned officers, 15,642 buglers, landsmen, etc., 1926 hospital assistants, 7221 artisans, 454,439 privates (including *Gefreite* and the *Kapitulanten* reinlisted, but not yet promoted as non-commissioned officers), 2072 medical officers, 1102 military paymasters, inspectors, and others, 579 veterinary officers, 1069 armorers, 93 saddlers, and 97,280 horses. The estimates are considerably larger than those of the current year, the Prussian contingent alone calling for an increase of 2,027,495 marks. The new formations make it necessary to create some fresh positions in the higher grades of the service, notably for two inspectors and four brigade commanders for the foot artillery. The ballooning section is to be separated from the railway regiment, and a depot is to be formed for military railway material. Lastly, the operations of the War Academy are to be extended, the number of those attending the courses being increased from 300 to 400, and preparations are to be made for opening a non-commissioned officers' school at Bartenstein.

THE GENEVA CONVENTION OF 1864.

The Geneva Convention of 1864 seems to have been discussed at the Conference of the Institute of International Law. The experience of the Franco-Prussian war goes to prove that either side in the throes of a death-struggle will be quick to accuse the other of breaches of the Convention, and to threaten to retaliate by acts of similar brutality. What is specially wanted is machinery for inquiry, so that the truth may at once be ascertained. Various schemes for preventing infractions of the Convention were

suggested. M. Van der Beer Portugaal, a Belgian general, favored the idea of a permanent military commission to hold inquiries in such cases. Another proposal was that each belligerent should depute military authorities of its own to act as a check on their brother officers. Finally, the proposition of M. Lammasch was adopted, that either belligerent complaining of violations should be able to appeal to a neutral state, who should exercise the sort of voluntary supervision of a bystander in a street fight; the state appealed against must hold the inquiry, punish the offender, and report what has been done to this neutral government. This scheme has, perhaps, says the *British Medical Journal*, the merit of being a trifle less unworkable than the others, but the position of the neutral state as a registration officer can be no guarantee of the *bona fides* of the inquiry.

MEDICAL STATISTICS.

The following figures are taken from a lecture recently delivered before a scientific society in Paris. It is well known that, as a rule, the deaths from disease far exceed in number those due to the enemy, but this is a rule not without an exception. The German army in 1870-71, out of a total of about 913,000 men, lost 44,000, of whom only 12,000 died of disease. This is stated to be the first time in history in which an army on a campaign ever lost fewer men by disease than by the enemy's fire; and the fact is attributed, in a large measure, to the German forethought and superior sanitary organization. The French army in the Crimea, numbering nearly 309,000 men, lost 95,000, but only 20,000 of these were killed or died of wounds. In Italy, in 1859, the French army of 200,000 men lost 122,000, of whom 10,000 died of disease. In the American Civil War the losses of both armies from disease are stated at 302,000 out of over 2,000,000 men, but of these losses only 11,600 were inflicted by the enemy. In Bohemia, in 1866, the Prussian organization had not reached its subsequent state of perfection, 2931 having been killed by the enemy's fire and 6400 by disease. Still, this is comparatively a small proportion, and is most creditable to the sagacity of the heads of the Prussian army of those days.

SIR EVELYN WOOD'S "CAVALRY."

Sir Evelyn Wood's "Cavalry in the Waterloo Campaign" (Sampson Low and Co.), containing his articles contributed to the *Pall Mall Magazine* cast in a larger shape, is a remarkable evidence of the "cavalry revival." Those who now hold in this country that modern weapons have swept cavalry from the battle-field are probably few, and, as Sir Evelyn shows, the value of the mounted arm has gained still greater recognition on the Continent. He holds the continental view rather than that of the diminishing number of his comrades who have no faith in cavalry, on the ground that rifle practice is executed in peace and war under conditions so materially different as to furnish unreliable data on which to base deductions of any value, and also because the moral element remains the same. It might have been thought that nothing new could be added to our knowledge of the Waterloo campaign, but we have not lately read a more interesting military essay than that which Sir Evelyn has devoted to a delineation of the achievements of

the cavalry. Wellington seems to have undervalued the mounted arm, and hence perhaps its services in 1815 have not been fully appreciated. Except for Sir Hussey Vivian, no writer has hitherto done full justice to it. Yet no achievement could have been more splendid in its results than the charge of the Household and Union brigades, which wrecked d'Erlon's infantry corps so completely, with some of its artillery, that the infantry were unable to advance again until late in the day, and then with much reduced vigor. It is true that the Frenchmen were distinctly inferior to the splendid forces Napoleon had commanded in former wars, and were besides grouped in dense, unwieldy masses, which placed them at serious disadvantage; but, nevertheless, the triumphant course of the British cavalry was a splendid illustration of the value of well-trained cavalymen boldly led. There was want of battle discipline among the rank and file, but this is partly explained by the lack of definite orders and of proper support, which resulted so disastrously for the brave cavalymen. Lord Uxbridge, in undertaking a brigadier-general's duties, made a mistake for which "there was absolutely no excuse." As to the French cavalry, says Sir Evelyn, they failed to break our ranks owing to want of training, to the officers being strangers to the men, and to the courage and discipline of our infantry. Moreover, they lost heart and vigor later in the day. His demonstration of the importance of cavalry is of even greater value because of the fact that in the Waterloo campaign the force did not exercise those duties in reconnaissance which are now recognized as one of its chief functions. The volume before us is filled with the interesting and instructive reflections of a brilliant soldier of large and wide experience. He has done great service to the cavalry cause, and his volume is an admirable addition to the "*Pall Mall Magazine Library*."

Comment and Criticism.

I.

"The Fourteenth Infantry."

Captain Frank F. Eastman, 14th Infantry.

IN the July number of THE MILITARY SERVICE INSTITUTION, there is a table compiled from "Fox's Regimental Losses." The total of killed and died of wounds is given for all regular regiments, and an average is given of losses by companies. Fox gives the 14th Infantry credit for the greatest loss in proportion to numbers of any regular organization. Capt. Evans, on the assumption that the 14th had 24 companies in the field, gives it an average loss per company of only 11.5. The fact is that the 14th never had more than 16 companies organized until after the war. In the campaign of 1862 it had both battalions at the front, and its loss per company that year was an average of 10 per company.

The 16 companies were consolidated into 8 on March 1, 1863, and its loss in the two campaigns of 1863 and 1864 averaged 25 men per company. Taking 16 as the divisor for the war, the average per company would be 23.4, as the total loss of the regiment, killed and died of wounds, was 234. This does not include the missing, many of whom were killed in the Wilderness and burned past recognition by the fires which raged over the field. The third battalion of the regiment was not organized until November, 1865, long after the termination of hostilities. The officers of the 14th think they can prove from the Rebellion Records that the heaviest Confederate loss was sustained by regiments which are known to have opposed them in battle.

II.

"Wanted: A Fitting Artillery Organization."

Lieut.-Col. S. M. Mills, Commandant of Cadets, U. S. M. A.

IHAVE read with interest Lieutenant Best's article on "A Fitting Artillery Organization," and I think it contains the germs of the best and most satisfactory artillery organization that we could have.

Its publication and discussion at this time is most opportune, and it is hoped that radically opposed views, if there be any, may be reconciled or modified by the strong array of facts and arguments here presented.

The public discussion of this subject may help many of us to a better understanding of the particular organization required for the artillery at this time. There seems to be a great lack of unanimity upon this subject. The author refers to the seven or eight different forms for administrative purposes that have existed in the past for the artillery. The period involved in these changes covered the early history of the Government, and were made necessary by the natural development of the artillery as an arm of the service and the peculiar conditions that existed with us; latterly, however, and within the period of one year (last year), we find five different projects before the military committees of

Congress, or under discussion for the better organization of the artillery. This would seem to indicate a lack of understanding of the real needs of the service, probably due to want of an opportunity for more general discussion, with interchange and modification of views to suit the circumstances. An opportunity is now offered for this discussion in the suggested organization before us, which in every essential in my judgment meets the modern requirements.

The author does not go very much into details, and I think he is entirely correct in that, as they are less important and will adjust themselves. He is, however, very clear and strong in the more important features, particularly for a chief of artillery, and in placing him directly under the General-Commanding-in-chief. This is most important, and I believe with that feature alone and otherwise with our present organization we could work out something for ourselves, but we should have other modifications.

The established company organization for cavalry and infantry, as the author says, is not a suitable organization for a company of sea-coast artillery; this must be apparent to all who consider the subject at all.

If there be those who think the regimental organization is the better both for the field and sea-coast artillery, surely they must admit that the strength of the company should be variable, and with the subdivisions, should be such as to meet the particular needs of the service it would be called on to perform, which service as the author points out is decidedly variable.

The author calls attention to many administrative provisions which we have as yet taken no steps to provide for. Some of these, it is true, will require legislative action, others are matters of regulation, etc. These and many other questions for the want of a recognized head to direct, arrange and properly present to the Secretary of War, are being put aside and neglected from day to day.

The time may come when some war minister may ask - and under pressure, too—for a well digested scheme for manning and operating the sea-coast works. The Chief of Engineers might reply, "I have completed the works and have prepared the emplacements." The Chief of Ordnance might answer, "I have manufactured and delivered the armaments to the various points selected for defense." Of whom might it be expected that this information would be obtained, but from the General Commanding the Army, who with his chief of artillery and expert staff had patiently and diligently worked out every detail of administration and organization for each particular locality.

Every effort should be exerted to impress upon those in authority the necessity for this great need. Nearly every paragraph of the paper contains ideas susceptible of commendation.

Captain James Chester, 3d Artillery.

Lieut. Best's paper on "Artillery Organization" is excellent and timely. Of course the subject is not new. It has been under discussion for years and it is important. Artillery efficiency, which may mean national safety some day, depends upon it, and there is no reason why the main points at least, should not be enacted into law.

In the artillery as at present organized, efficiency is almost impossible. No matter how able and zealous an artillery colonel may be, much of his regiment will always remain outside his influence. Broken up into small garrisons, all of which—excepting his own post—dependent of him so far as drill, discipline and training are concerned, he cannot be held responsible for their efficiency. Where there is no command there can be no responsibility; and where there is no responsibility there can be no efficiency. The artillery must have a responsible head before it can fulfill the purpose of its existence.

But, it may be said, infantry regiments with a similar organization and liability to distribution manage to maintain efficiency under their colonels; why should the artillery have

any difficulty? The answer is, the cases are not parallel. Let any one who thinks they are, pay a visit to Sandy Hook and take a look at the machines and machinery which artillery soldiers have to be taught and trained to manipulate; let him watch the loading and laying of a high-power gun; let him reflect that it costs the nation \$1000 to fire that gun once, and if the gunner is incapable might cost it as many millions in an emergency; and the chances are that the supposed parallelism will disappear.

The idea that a battery of heavy artillery is only a company of infantry with an artillery attachment to its training is a very common one, even in the army, and artillery officers are greatly to blame for it. Where is the heavy artillery garrison that is not drilled and paraded as a battalion of infantry? Where is the heavy artillery battery that is habitually inspected at its guns? Why is the very purpose of its existence thus tacitly ignored by its own officers? Simply because it is the custom. They have learned their duties that way. The infantry idea has been hammered into them. Recently, however, that is within the last twenty-five years, a new idea has been trying to develop itself. Many artillery officers—most of the younger ones perhaps—are now convinced that the man who learns the gunner's trade in a three, or even a five years' enlistment, has no time to spare, even if he has fair intelligence for a foundation. Without intelligence he can never learn it.

These conflicting ideas exist in the artillery to-day. The younger one, the artillery idea, is undoubtedly a child of the Artillery School. The other one may have been born at West Point. At least it has the ear-marks of that institution. Be that as it may, the two ideas are in conflict and the infantry one has control. This must be changed before artillery efficiency becomes possible, no matter what the organization of that arm may be. So, while I agree with Lieut. Best in all his points and propositions; and heartily wish that our legislators could see the necessity for reorganization and reformation as clearly as he does, I would submit as an amendment to the *lex non scripta*, that hereafter, *artillery troops shall confine themselves strictly to artillery work*. That is the only way they can ever become efficient in their specialty.

Of course, in discussing the details of any scheme of reorganization and reformation such as the artillery requires, differences of opinion will arise, even among artillery officers. The creation of perfection is impossible to humanity. Conservative minds will always believe that the old way is the best; and individual interest and personal prejudice will warp the judgment of the best of men. These classes combined constitute a formidable army. They are in possession and entrenched. Their position cannot be carried by assault. It must be reduced by regular a proaches. If the outworks can be carried at the first onset, the assailants ought to be thankful. And they can be carried. Indeed it is not likely that they will be stubbornly defended. Many of them, perhaps the most important ones, are likely to be yielded without a struggle. The necessity for a chief to command for instance, seems to be generally conceded. So also, that the corps should be increased; that it should be made numerically equal to the work it has to do. Such an increase would leave it less than one-tenth of what it would have to be in case of a foreign war—surely a morsel of heaven that should satisfy the strictest economist. But it is not economy to neglect expensive machinery. There is a heap of money invested in a modern armament all of which will be worse than wasted if the armament is not properly cared for or unskillfully used. The man behind a modern high-power gun needs intelligence. Artillery recruits should be carefully selected men. Now intelligence is a marketable commodity, and purchasers must pay the market price. No doubt men can be recruited for the artillery at \$13 a month; but, it has been said, congressmen could be hired at a similarly low figure. The question is, would they be suitable? Men physically fit and men mentally fit as well as physically, are very different commodities, and bring very different prices in the market. If the latter is required the market price must be paid. The

blunder of the blockhead in a gun detachment might cost more than the maintenance of a regiment for a year, not to mention the lives that might be lost. Complicated machinery, such as modern gun-mounts, cannot be safely operated without intelligent men. That fact conceded, increase of pay cannot be refused.

With these three salients gained,—namely a chief to command; an increase of the corps; and an increase of pay for qualified gunners,—the whole position is bound to surrender in course of time, without further effort. The regimental organization is likely to be stubbornly defended; but with a chief in command it can do no particular harm to the corps. It will doubtless disappoint its defenders in many ways. It will hamper the chief in his assignments, and bind batteries together in inconvenient bundles.

There is nothing clearer to my mind than the unwisdom of having all heavy artillery batteries of the same numerical strength. The numerical strength should be determined by the guns a battery is assigned to serve. So also, I believe that Southern artillery stations should be garrisoned by Southern men—men enlisted in the vicinity of the station—and that they should be left there permanently. The longer an artillery garrison remains at a sea-coast station the more valuable as a defensive force for that position it ought to be. These facts are bound to be recognized in time, and become strong arguments against regimental organization. But with a corps organization in fact, the artillery can afford to wait for it in form. Congress is always with us, and our laws are not like those of the Medes and Persians. Let us get the salients if we can, and then wait.

Captain Peter Leary, 4th Artillery.

Lieutenant Best's article is a timely contribution to a subject of paramount importance to the service. The re-organization of the artillery will, in all probability, be carefully considered in the Fifty-Fourth Congress, and if the Government shall attach to the subject the importance to which it is justly entitled, beneficent results must accrue to the country.

It must, however, be shown as a condition precedent to the adoption of any scheme of re-organization, that the primary object to be attained is artillery efficiency. This depends not only on the best discipline, equipment and instruction, but also on the best practicable organization, and as a result of it, on a steady flow of promotion of officers, equitable alike to the country and the officers.

But, in this connection, the non-military nature of our people enters seriously into the consideration. A scheme of re-organization the tendency of which shall be to change the artillery into a corps which cannot be promptly used in emergencies as infantry against either Indians or mobs, will not, under existing conditions be favorably regarded by Congress. Such a scheme would not conform to the necessity for an economical military system, a principle which cannot be ignored in any contemplated army legislation.

But by the development of artillery in every direction, its power as an arm of battle has been remarkably increased; so greatly, indeed, that the army has a right to ask that its value in action shall not be imperilled by a defective organization. The opinion of General Hunt on the relation between organization and efficiency must be accepted by all as conclusive. He tells the Massachusetts Historical Society this:

"I have failed in my purpose, if I have not made it clear, that with proper organization and administration our artillery in the Civil War, good as it was, might have been more serviceable and produced greater results; that the War Department cannot manage it and that its pressing need was and still is, a responsible chief for the whole arm with a competent staff, military and administrative."

Here then we have the starting point of reorganization. It may be said by some artillery officers, that neither the War Department nor the department commanders will sanction any scheme which includes the establishment of a chief of artillery, in a place of

responsibility and necessarily of authority at the headquarters of the army. This is not a consideration to be regarded in the premises. A general officer of artillery, with absolute rank and command is not probably such a responsible chief as General Hunt indicated or expected. But a chief of artillery, charged with the legal obligation of recommending to the Commanding General of the Army such measures of legislation, armament, equipment, instruction and assignment as may appear to him important to the best interests of the country is what he indicated and what is now, more than ever, needed. In the administration of his office, such a chief would not be called on to overturn the conservative customs of the service where custom is proved to be wise and just what the service needs. He would not trespass on the just and appropriate functions of any of the fiscal departments of the army. He would, however, stand ready to urge the best interests of the artillery and his work would be regarded as that of one placed in authority. From the restricted nature of our artillery force he could not and should not exercise direct command, because every part of the artillery strength would be serving in a geographical department under the command of a general officer and military discipline cannot recognize two commanders of equal and coordinate authority over the same organization. As the artillery adviser of the Commanding General of the Army his functions would be all-important and, if well discharged, of great value to the army and the country. He should be, *ex-officio*, a member of the Board of Ordnance and Fortification. He should be detailed for four years from the field-officers of artillery, to report to the Commanding General of the Army and during the period of his detail should have the rank, pay and allowances of a brigadier general, with such a military and administrative staff, as the needs of the service, either in peace or war, might require. An officer having served one term as chief of artillery should not be eligible for another.

With Lieutenant Best's conclusion that the battery is for our service the proper unit of organization and administration, the writer feels constrained to join issue. Here enters again the question of the peculiarity of our people among all great nations, in maintaining a small standing army and depending on volunteers for expansion in time of war.

The organization of our coast and field artillery must be of such a nature that, when composed of volunteers, it will, after a reasonable period of instruction, be efficient in a campaign either in fortifications or in the field. We cannot, without extreme risk to the country, have one system of organization for regulars, in peace, and another and different one for regulars and volunteers, in war. Under such conditions we would enter a war with disaster a foregone conclusion. During the Civil War the regiments of heavy artillery, which were recruited in the sea-board States, in some cases from one thousand to eighteen hundred strong, remained, in only one case, as far as the writer knows, on duty in the coast defenses. The Third Pennsylvania Artillery was retained at Fort Monroe, Va. All the others were either engaged with the siege trains of the Army of the Potomac as was the First Connecticut Artillery under the distinguished General Abbot or served handsomely and efficiently as infantry as the Fifth and Eighth regiments of New York Heavy Artillery. Had there been no regimental or battalion organization the difficulties of administration and supply of those troops would have been many and embarrassing. It would not serve the interests of discipline or efficiency, if, under stress of circumstances in war, battalions and regiments must be improvised and assembled in units which have had no common interests, traditions or sentiments. No nation can afford to lose sight of its military traditions and no officer should fail to be proud of his regiment. The sentiment of regimental pride is a most potent factor in action. It would be a distinct loss to the artillery to have regimental feeling destroyed by the discontinuance of regimental organization. With foot batteries organized into battalions and battalions into regiments they could be used under any conditions of service, either as detached separate batteries

or battalions or regiments, with as many regiments and as many field officers as Congress may allow.

The question of promotion should and will be considered on its just merits and it is expected that the appointments of field officers of artillery in new regiments will be by seniority and not by selection, which, in its nature is invidious and apt to be wrong. All vacancies should be filled by the promotion of those who stand first in the next lower grade in the artillery line. The law should be so unequivocally framed that it shall not be possible for an officer to be selected from the other arms or from any staff department or corps and made a field officer of artillery. Those who have suffered for so many years from slow promotion are fairly entitled to the advancement which will follow an increase of artillery.

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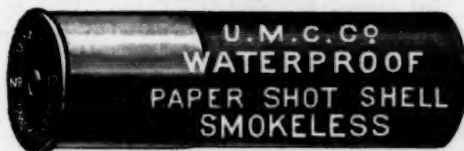
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Reviews and Exchanges.

Story of the Confederate States.*

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This sets the key-note of the *Story*, and it is told with an evident desire to be truthful and just.

There is no objection whatever to be made to the purpose and but little, if any, to the method.

And the sentiment of the South as quoted from the conclusion of the book certainly contains nothing offensive or inconsistent. "With no feeling of shame, but with a consciousness of duty well performed in their brave defense of what they deemed the right," the South have "accepted in good faith the results of the war, abandoned secession, and without mental reservation agreed to the abolition of slavery. In the same good faith they renewed their allegiance to the Union and are ready to defend it against any and all foes. They build monuments to their hero dead and tell of their valorous deeds to their children's children. They cherish as a sweet memory the Southern Cross, under whose folds their ragged, half starved veterans performed such mighty deeds of valor, but at the same time they hail the Stars and Stripes as the banner under which the great Southern General Washington led their fathers to victory and independence and look upon it as the symbol of sovereign co equal States joined together in an indestructible Union."

It would be difficult to quarrel with this declaration, unless we enter a demurrer against the limitation to latitude of Washington. He was a Virginian by the accident of birth, but he was more than that—far more. As observed of him by another writer, "There has never been a man more thoroughly and truly an *American*. And again, "No higher purer *Americanism* than his could be imagined."

It was Washington's wish that "we might be one people, one in speech, and one in political faith." And it should be remembered that for the vital question of 1861 Washington is elsewhere on record as stating "Slaves were bequeathed to us by Europeans and time alone can change them, an event which you may believe me," he says, "no man desires more heartily than I do. Not only do I pray for it on the score of human dignity, but I can already foresee that nothing but the rooting out of slavery can perpetuate the existence of our Union by consolidating it in a common bond of principle."

For the fact cannot be disguised that slavery led up to the war as the only remaining solution of the business, and to such a war there was only one result possible unless we are prepared to assert either that God is a hypothesis merely, for which war has no place, or that slavery was of Divine origin and entitled to the Divine care.

* *Story of the Confederate States*. By Joseph T. Derry, of Georgia. B. F. Johnson Publishing Co. Richmond, Va.

And if, as the *Story* claims, God gave to the South the "victories that shed such lustre on their arms," the *Story* must also accept the conclusion, as it logically does, that "God in His wisdom had given to them final defeat."

As Jefferson said himself, speaking of a possible revolution in the fortunes of master and slave, "The Almighty has no attribute which can take sides with us in such a contest."

We believe it to be true that what was originally more or less of a passive attitude among the founders of our government in the matter of the "peculiar institution" was changed to a persistent aggressive policy for its defense and extension in large measure by reaction from the assaults of the Abolitionists, and have no objection to offer to the proofs in support from the book under review.

Jefferson is quoted as advising nullification by the State in case the general government exceeded its delegated powers. We doubt if a man who preferred embargoes to war and shore gunboats to commerce destroyers contemplated nullification by any more violent method than a formal protest, nor do we feel at liberty to make any heretical use of the Fathers, whether Apostolic or Republican.

If taken at all they should be taken as a whole, and the same hand that wrote the Kentucky resolutions also wrote in reference to slavery: "I tremble for my country when I reflect that God is just and that His justice cannot sleep forever."

President Lincoln summed up the whole matter when he affirmed: "A house divided against itself cannot stand; this Government cannot endure permanently half slave and half free."

The Abolitionist proclaimed the Federal Constitution to be "a covenant with death and an agreement with hell."

The South undertook to withdraw from the Union and set up a Confederacy outside of it with slavery as the corner-stone.

Between the two the war had to come and slavery had to go, and that was the end of it.

Nor is war the worst of evils. Bondage is worse, whether to race, class or individual; anarchy is worse, whether the anarchy of the Commune at Paris or the mob at Chicago.

So to us the Confederate failure would seem not entirely to grow out of any of the causes assigned, such as "Inferiority of resources, money, numbers and international sympathy," but rather to have been bound up in the real cause of the war.

As for the "international sympathy," it is difficult to see where it comes in except as taking the form of Confederate cruisers and candidates for a Mexican empire.

Apparently the sympathy was with the South, only contenting itself with letting "I dare not wait upon I would," as elderly tabby cats generally do.

In the account of the war the scales are held tolerably even. If there is a little tip now and then toward the Southern Cross it is not exorbitant or unnatural. There is no danger that the glories of those who win shall ever lack poet or historian. It is Troy that has no singer, Carthage that bequeathes no anniversaries. And it would be a very captious spirit that would seek to find fault with the comment upon the fight at Franklin. "Of all the battles of the war there was not one more hotly contested. A reunited country should cherish with pride the memory of the gallant men who attacked and the equally gallant men who held the works that terrible November afternoon." And so we do.

The story of the Confederate States may very properly be given a place in any Northern library, where it will abide, even with the memoirs of Grant, Sherman and Sheridan, Johnson and Lee, as peacefully as these heroes themselves now wait united beyond the River which so few of their old companions have still to cross.

H. W. C.

Reflections on the Art of War.*

These reflections, the author says in his preface, are little more than a compilation of notes made for his own instruction; but this modest estimate of the work will not be concurred in by his readers, who will congratulate themselves on having placed before them a readable book from which they can derive much interesting and valuable information.

The work begins with a chapter on "The High Qualifications of Great Generals," in which so many rare and admirable qualities are set forth as requisite for a commander that a soldier ordinarily gifted might, in comparison with the paragon possessing them, well despair of becoming even a *bon général ordinaire*. But, as the author points out, "most great generals have had some serious defect in character, neutralized, however, by some still greater virtue," and Marshal Saxe, indeed, gives as the three requirements of a commander merely courage, fertility of resource, and good health. To these certainly should be added professional knowledge, and the matter of good health might perhaps be somewhat modified; for Saxe himself, according to Carlyle, when he won his great victory of Fontenoy, was "nearly dead of dropsy; could not sit on horseback except for a few minutes; was carried about in a wicker bed; and had a lead bullet in his mouth all day to mitigate the intolerable thirst." So, too, Masséna, at Wagram, the most glorious day of his entire career, commanded from his carriage, with his surgeon at his side; and Wolfe, at Quebec, was so broken by disease that his glorious death on the battle field only shortened his life by a few weeks or months at most.

The author truly declares that the general is the very life and soul of an army. "It was Hannibal and Napoleon who crossed the Alps; their armies merely followed. On how many occasions was Napoleon the main spring of all action! The passage of the Guadarama mountains during the forced march in pursuit of the English army, in December, 1808, is one good example. Again, it was the spirit of Blücher which inspired the army that retreated from Ligny to fight at Waterloo." Similar instances might have been cited from our own history. It was the indomitable pluck and energy of Andrew Jackson that inflicted upon the British the bloody defeat at New Orleans. Had the American army at that place been commanded by a Dearborn or a Wilkinson the result of the battle probably would have been less pleasing to our national pride. Again, to quote Swinton; "Not the Army of the Potomac was beaten at Chancellorsville, but its commander; and General Hooker's conduct inflicted a very severe blow to his reputation. The officers despised his generalship, and the rank and file were puzzled at the result of a battle in which they had been foiled without being fought, and caused to retreat without the consciousness of having been beaten." The retrograde movement of the Army of the Potomac after Chancellorsville, and the forward movement of the same army after the Wilderness show the effect upon an army of the personality of its commander.

The second chapter of the book deals with the Theory and Practice of War, and opens with the following words: "Those who would pass from the theoretical to the practical knowledge of war must cross the field of battle—there is no other way—but by study, by reflection, and by practice under peace conditions, a theoretical knowledge of war can be acquired, sufficiently sound to guide us clear of many disastrous mistakes when the business of real war has commenced."

The value of military study is clearly set forth, and supported by the views of the great commanders. Napoleon advised the reading and re-reading of the campaigns of Alexander, Hannibal, Caesar, Gustavus, Turenne, Eugene, and Frederick, and the imitation of these commanders as the only means of mastering the secrets of the art of war. "Welling-

* *Reflections on the Art of War.* By Colonel Reginald Clare Hart, V. C., Director of Military Education in India. London: William Clowes & Sons.

ton told General Shaw Kennedy that he 'had always made it a rule to study for some hours every day.' And it is a well-known fact that Cæsar, Turenne, Frederick, Napoleon, and Von Moltke studied deeply and constantly the art of war. Again, when Napoleon was dying, he dictated as follows; 'Let my son read and reflect on history. This is the only true philosophy. Let him read and meditate on the wars of the greatest captains. This is the only means of rightly learning the science of war.'

"Here, then, we have the dicta and the example of the greatest generals of ancient and modern times, emphasizing the importance of the study of theory. Like many others who might be quoted, these great captains fully appreciated the force of the old adage that 'knowledge is power,' and illustrated it in their own lives by their habits of constant study and reflection. But there are officers who pose as practical soldiers, and affect to despise all theory. These, however, are generally ignorant and obstinate men who know as little of the practice as they do of the theory of war. What guarantee can they offer that they would not make similar mistakes in war to those they make under peace conditions? Is it at all likely that their skill and judgment will be increased by the distraction of insufficient and misleading information, by the disturbing influence of personal danger, or by the immense responsibilities of actual war? Even if we grant such men the possession of some talent, how can we be sure that they will not 'some day find themselves compromised on service from want of knowledge, not from want of talent'? Napoleon said; 'Quand l'ignorance fait tuer dix hommes là où il n'en devrait pas coûter deux, n'est elle pas responsable du sang des huit autres?'

"There are no doubt men—Cromwell, Lee and Grant are examples—who have risen to fame, whose military education, in the sense that we now understand it, was of the scantiest, and whose training in the art of war was confined almost exclusively to its practice in the actual theatre of operations; yet surely it is as dangerous as it is presumptuous to quote such extraordinary precedents as excuses for ourselves to despise or to neglect that earnest study of theory, as illustrated by the campaigns of the past, which the greatest soldiers have all declared to be essential. The man who is gifted with genius and with inspiration is born, not made, but even he—Napoleon was an instance—may improve his knowledge of the science of war by reading and reflection. * * * It is exactly the same in other professions. The great man cannot be elaborated by any human agency. But it is no argument against study, that no amount of application and no amount of Parliamentary experience can transform an ordinary man into a statesman of the calibre of Pitt. In the same way an ordinary man cannot hope to perform the feats of a Hercules, but that is no reason why he should not strengthen himself by physical exercise."

Colonel Hart really makes too much of a concession to the natural-genius, practical-experience, cranks, who affect to despise military study, by citing Cromwell, Lee and Grant as men of scanty military education. Cromwell began his military career as a captain of cavalry, and in addition to his long and varied experience in actual war before he held supreme command, it is by no means certain that he was not a careful student of the theory of war. On this subject Colonel Maurice says, in his essay on Military Literature: "During those years before the meeting of the Long Parliament which Cromwell spent quietly on his farm, all Europe was ringing with the exploits of one of the most brilliant of all leaders of war. Some of the best accounts of his mode of fighting, and of his battles which we even now possess had been published in England. Five hundred Englishmen, almost all of them naturally of Cromwell's religious party, many of them Cromwell's acquaintances at least, had served in the armies of the great 'Lion of the North.' It may have been the case, of course, that just at the moment when everything was looking in England as if only the sword would decide the issue, Cromwell carefully abstained from interesting himself in the story of those wars of Gustavus Adolphus, of Wallenstein, and

of Tilly, with which every one else was absorbed. Neither his letters, nor his speeches, nor his conduct of battles look to me as though that were true. I find him at the very first entrance into the war acting on principles which past experience had established, following closely upon just that stage which the art of war had reached under Gustavus, using the very same moral stimulus which Gustavus had made so effective, using the very words on one occasion which Gustavus had used on another, and, as I think, indicating in various ways that he had most carefully studied the past, though he had not had the opportunity of doing any peace-parade work."

In point of military education, Grant and Lee in 1861 would easily stand comparison with most European soldiers, for they were both graduates of West Point, and had both served in the Mexican War. That their military education was scanty as compared with the present standards is no doubt true; but it was probably no scantier than that of Raglan or Simpson, of St. Arnaud or Pellsier, of Gyulai or Benedek, of Bazaine or McMahon; for they were all educated soldiers with actual experience in war.

In the chapter on The Fortune of War the influence of chance is considered, and a number of interesting instances are cited. The atrociously bad luck of Napoleon in the Waterloo campaign—a campaign in which genius succumbed to mediocrity, and the best laid plans of the greatest of generals failed to command success—is considered, and a striking case less generally known is quoted from Alison's description of the campaign in the Pyrenees. "Dispirited and worn out as his men were, Soult was in no condition to force any of these formidable defiles, defended by victorious troops, and his surrender seemed inevitable. So hopeful was the English general of such a result, that screened by the rocks, from behind which he surveyed the whole valley, he prohibited his men from issuing forth to capture Soult himself, who was seen riding in a careless way along its bottom, lest the catastrophe should awaken the French army from its perilous dream of security, and issued the strictest orders that not a man should show himself from behind the ridge which concealed them from the enemy. At this moment, when every bosom beat high with exultation at the expected glorious trophy of their valor they were so soon to obtain, in the surrender of a whole army with a marshal of France at its head, three British marauders issued from their concealment to plunder in the valley. The sight of the red coats was not lost upon Soult, who instantly perceived the imminence of his danger. His whole army was immediately put in motion, and hurried towards the passes leading to the Lower Bidassoa by Estevan, which they got through just before the Spaniards under Longa, or the light division, came up to close the terrible defiles. Such is war: the disobedience to orders by three soldiers saved France from the greatest calamity, and deprived England of the greatest triumph recorded in the annals of either monarchy. It soon appeared from what a fearful danger the emerging of these marauders from their retreat had delivered the French army." It would be interesting to know the fate of the three marauders, and whether the British commander was able to express himself in anything but dashes and exclamation points for a fortnight afterwards. One is reminded of Marbot's disappointment before Leipsic, when the discharge of a carbine by a nervous trooper prevented the capture of the sovereigns of Russia and Prussia by a French cavalry patrol.

In concluding the chapter, the author says: "But, it may be asked, if Fortune may upset all calculations, why seek to attain to the high qualifications mentioned in the first chapter? True, luck has sometimes pulled an incompetent general through, especially in what are known as 'soldiers' battles'—battles won in spite of bad generalship. But, while bad and good luck will occur to all, it is only the commander who possesses knowledge and power who will know how to combat the one and profit by the other. It is not so much that generals do not get their opportunities in war, but that disasters are

nearly always the direct result of want of knowledge, and of want of qualifications for command."

The discussion of The Moral Effect in War is extremely interesting. "An ordinary man," says the author, "will appear sufficiently calm under fire, carry out his orders, and take his chance; but when it is a question of troops *en masse*, their behavior in battle is affected by many complicated emotions and many conflicting forces. Such an apparent trifle as a strain of martial music, or even the state of the weather, may have a marked effect upon the animal spirits, and the men may be sullen and gloomy to-day who but yesterday carried victory on the points of their bayonets. Will they now advance, or will they retire? Has the limit of human endurance been reached? There is nothing certain in battle." Quoting Antomarchi, he continues: "'Dans toutes les batailles,' said Napoleon, 'il arrive toujours un moment où les soldats les plus braves, après avoir fait les plus grands efforts, se sentent disposés à la fuite cette terreur vient d'un manque de confiance dans leur courage; il ne faut qu'une légère occasion, un prétexte pour leur rendre cette courage; le grand art est de le faire naître.'" Of this great art Napoleon was the master; the mere fact of his presence was sufficient to rally his troops and restore their courage. Skobelev, of heroic courage himself, realized the limits of endurance in others, and under his leadership the Russians fought with conspicuous bravery."

The following extracts should be considered by those good Americans who—in spite of the warnings of our own history—think that enthusiasm, patriotism, and valor would suffice to make our raw troops win victories. "Napier uses a curious expression—the mechanical courage of discipline"—which truly expresses the power of discipline. A man may hesitate voluntarily to encounter almost certain death, but trained and controlled by discipline, he will obey mechanically because 'the practice of the parade ground becomes the instinct of the battle-field.' * * * When troops are closely engaged and without any marked relative advantage in arms, numbers, courage, or situation on either side, why does one side overcome, and the other waver and finally give way, when the actual losses are too small to make any material difference? Simply because 'the mechanical courage of discipline' will prevail, in that it induces a cohesion which gives the men stouter hearts, and enables them to last longer, and endure a greater strain. * * * Natural courage will always tell, but disciplined courage will tell more, because of the moral confidence it engenders, and therefore, notwithstanding the mechanical inventions for the destruction of life, small armies of brave, disciplined, and well-commanded troops will in the future, as in the past, vanquish large armies, however brave, if they are ill-commanded, ill-disciplined, and consequently lack confidence and cohesion. * * *

"Enthusiasm may count for much. However, 'it is but burning straw unless the true soldier spirit be present; it flares up in a short time but goes out at once, as soon as it is chilled by the reality of war with its hardships and dangers.'"

In the interesting chapter on Strategy and Tactics are two statements which cannot be altogether accepted. The author says: "A general may have such confidence in the fighting powers of his army, that he may be justified in disregarding his own communications while striking at those of his adversary. This was the case at Mars-la-Tour; and notably so at Gravelotte, where each side faced its own base, and the Germans staked everything on a victory." Now, in point of fact, the German communications were in no danger at Mars-la-Tour; and at Gravelotte Von Moltke did not stake everything upon the result of the battle. To be sure, he planted his army so squarely across the French communications that each army fought with its face turned towards its own base; but while the French communications were completely cut, those of the Germans were not. Von Moltke held strongly to his communications with his right flank; and in case of a reverse he would, at worst, have only been compelled to take up a defensive position "forming

front to a flank," facing north, and with the army of the Crown Prince but a short distance away and able to march promptly to his support. Such a position would, to be sure, have been strategically disadvantageous, but it need not have been fatal any more than Wellington's position was at Salamanca. Again the author says: "Under certain circumstances, an able commander should not hesitate to forego tactical advantages, within certain limits, in favor of strategical considerations. Lee did so at Fredericksburg when he allowed Burnside unopposed to cross the Rappahannock to make him fight with the river close in his rear; and when Burnside was repulsed he only escaped ruinous disaster because Fortune was undeservedly kind to him, and induced Lee, for reasons which may be explained, but cannot be excused, to refrain from counterstroke or pursuit." This is erroneous. Lee took up his position on the heights for tactical reasons—for the purpose of utilizing a defensive position of exceptional strength. To have taken up a position on the banks of the river would have been to place his army at the mercy of the Union artillery and to sacrifice the enormous tactical advantages which the position on the heights gave him. The chapters on the Offensive and Defensive are good. In the chapter on the Defensive, however, we find the following which is scarcely correct: "In the first example (Bull Run) the Confederates' success might have been far more decisive, but from political considerations they did not pursue." On this subject the Confederate commander, Gen. Jos. E. Johnston, says: "The Confederate army was more disorganized by victory than that of the United States by defeat. The Southern volunteers believed that the objects of the war had been accomplished by their victory, and that they had achieved all that their country required of them. Many, therefore, in ignorance of their military obligations, left the army, not to return. Some hastened home to exhibit the trophies picked up on the field; others left their regiments without ceremony to attend to wounded friends, frequently accompanying them to hospitals in distant towns. Such were the reports of general and staff officers and railroad officials. Exaggerated ideas of victory prevailing among our troops cost us more men than the Federal army lost by defeat."

In the chapter on Pursuits the vigorous pursuits after Jena and Waterloo are considered, as well as the failure to conduct an effective pursuit after Friedland, Wagram, Vittoria and Spicheren. Wellington's description of the British army after his great victory at Vittoria, shows the manner in which an army can get out of hand as a result of its own success; "We started," says he, "with the army in the highest order, and up to the day of the battle nothing could get on better; but that event has, as usual, totally annihilated all order and discipline. The night of the battle, instead of being passed in getting rest and food to prepare for the pursuit of the following day, was passed in looking for plunder. The consequence was, that the troops were incapable of marching in pursuit of the enemy, and were totally knocked up. The rain came on and increased their fatigue, and I am quite convinced that we have now out of the ranks double the amount of our loss in the battle; and that we have lost more men in the pursuit than the enemy have; and yet we have never in any one day made more than an ordinary march." Wellington, in fact, never pursued vigorously, the pursuit after Waterloo being exclusively the work of the Prussians.

The chapters on The Selection of a Position, The Effect of Modern Fire Arms, and Retreats and Rear Guards are all good, but the chapter on Cavalry is disappointing. The author shows an appreciation of the value of cavalry, and in common with most military authorities of the present day he believes that it still has a great field of usefulness in battle. It is astonishing, however, that so accomplished a writer as Col. Hart should have nothing to say about the dismounted fire action of cavalry. There is not a word in the entire chapter to indicate that the author is aware of the fact that there is such a weapon as a carbine, or that cavalry can do, and has done, excellent service with it. It is to be re-

gretted that the author has not turned his attention to the cavalry of the War of Secession; for though the American cavalry is often spoken of by English writers as "mounted infantry" and "so-called cavalry," the fact remains that in the matters of arms and their use the American cavalry in 1864-65 approached much nearer to the ideals of the present day than even the much-lauded German cavalry of 1870-71.

In the chapter on Artillery the author discusses briefly but clearly the question of massing the batteries. While advocating the massing of artillery he says: "Perhaps the best guide for a British officer is to keep the batteries of a brigade division together when possible; massing beyond the extent of a brigade division is of less consequence, and sometimes the disadvantages may outweigh the advantages." Quoting from the British drill book, he continues: "'In order to attain this object, it is essential that the artillery should march as close as possible to the heads of columns, that it should be used in masses of the greatest strength available, and that the batteries should be brought up at the very beginning of the engagement without waiting for the development of the other arms.' The greatest strength available for a corps means the artillery of the leading division, reinforced by the corps artillery. The batteries of a division marching in rear remain with it. On this point Prince Kraft is very decided: 'I do not contemplate the "possibility" of taking their artillery from the infantry divisions.'"

It may be well to note that the corps artillery combined with that of the leading division would comprise about seventy-two guns and that they would with the present range of artillery be able to cross their fire with that of the batteries of the other divisions. This should be considered by those sciolists who draw the peculiar conclusion from the axiom that artillery should be massed, that the massing of guns consists in placing the batteries side by side in an unbroken line, or that it would often be practicable to place the enormous artillery force of a modern army corps in one gigantic battery. As to the army artillery reserve the author has nothing to say; probably for the same reason that he makes no mention of the Macedonian Phalanx—he does not discuss ancient history.

In the chapter on Engineers is the following quotation from Boguslawski, which needs no comment: "'The works directed by Engineer officers, however excellent they may have been with regard to their technical execution, did not always show that these officers had, so to say, understood how to reduce to practice the tactical ideas of the present time.

"'In order to instruct Engineer officers in tactics, it would appear advisable to attach them to infantry for some weeks in summer in the same manner, only on a larger scale, as they are now attached to pioneer battalions. It is further desirable that the latter should take a larger share in our field manoeuvres, and that detachments of them should be furnished to commands of the other arms.'"

From the chapter on Marches, Supply, etc., the following extract is well worth quotation:

"With English armies it has been the wise and honorable rule to pay for all supplies. It often has been, and often will be, necessary to requisition what is wanted; but when payment follows, more than half the hardship of a requisition, however peremptory, disappears. 'The system which the Allies adopted on entering France was eminently calculated to render the inhabitants favorable to their operations: money, the sinews of war, was as abundant with them as it was wanting with us; they scattered it abroad with profusion, and took nothing without paying for it with hard cash on the spot. The English knew well that this affected generosity would do us more mischief than their arms, and, in point of fact, they thus obtained resources which we had been incapable of discovering' [Pellot, quoted by Alison]. The French, on the other hand, acted very differently in the Peninsula. 'The mode,' wrote the Duke, 'in which they provide for their armies is this: they plunder everything they find in the country; they force from the inhabitants,

under pain of death, all that they have in their houses for the consumption of the year, without payment, and are indifferent regarding the consequences to the unfortunate people. Every article, whether of food or raiment, and every animal and vehicle of every description, is considered to belong of right, and without payment, to the French army; and they require a communication with their rear only for the purpose of conveying intelligence to, and receiving orders from, the Emperor.' Such a system is more than reckless and unprincipled, it is a blunder; and in the end the evils of it must recoil, as history has abundantly proved, on the heads of those who adopt it. * * *

"The English soldiers, at times, plundered just as much as their opponents; and, perhaps, from their habits of intoxication, and the inferior class in society from which they were drawn, they were on such occasions more brutal in their disorders than the French. But there was one difference between the two, and it was a vital one to the inhabitants of the conquered countries. The English plunder was merely the unauthorized work of the common men, and was invariably repressed by the officers when order was restored, the whole supplies for the troops being paid with perfect regularity from the public funds of government; whereas the French exactions were the result of a systematic method of providing for their armies, enjoined by express command upon all the imperial generals, and forming the groundwork of the whole military policy of Napoleon." In our own history a striking illustration of the benefits of the system of supply by purchase is furnished by Scott's army in Mexico, which was bountifully supplied from the products of the invaded country. A less gratifying illustration might be drawn from the fact that, according to the official reports of both Sir George Prevost and General Izard, the British army in Canada, in 1814, subsisted on beef driven over the border by the farmers of Vermont and New York and sold to the English commissary.

In the final chapter, entitled "Old and Young Soldiers Compared; Sanitation," the following may be selected from much that is interesting: "'I had nothing,' said Ney after the battle of Lutzen, 'but battalions of conscripts, but I had good reason to congratulate myself on their conduct. I doubt if I could have achieved so much with the Grenadiers of the Guard. I had before me the best troops of the enemy, including the whole Prussian Guard. Our bravest warriors, after having twice failed, would probably have never carried the villages. But *five times* I led back those brave youths, whose docility, and perhaps inexperience, had served me better than the most veteran valour. The French infantry can never be too young.'

"Napier, with the experience of the long and severe fighting of the Peninsular War, makes the following remarks in his description of the French operations in Andalusia against the Spaniards in 1808, which resulted in the surrender of a large French army: 'The young French soldiers drooped under privations and the heat of the climate; six hundred were sick and the whole discouraged. It is at such times the worth of the veteran is felt. In battle the ardor of youth appears to shame the cool indifference of the old soldier, but when the strife is between fortune's malice and man's fortitude, between human suffering and human endurance, the veteran becomes truly formidable, while the young soldier yields to despair.'"

Lastly, it seems worth while to reproduce the author's quotation from *The Lancet* which sets forth the losses in the Crimean War: "'During the Crimean campaign of one year and a half, 341,000 men were buried in the district of Taurida, which includes the Crimea. The Russians lost 170,000 soldiers, the English, French, and Turks, 157,000; and there were 15,000 Tartar victims. Of this total, 324,800 were interred in the Crimea, including 210,000 in the neighborhood of Sebastopol. Those killed in battle were but 30,000, and allowing an equal number for the losses from wounds, 281,000 must have succumbed from disease. The deaths of sick persons sent away from the seat of war

were about 60,000 more, which makes the number of dead from the Crimean campaign alone over 401,000. It will be seen from the above calculation that out of some 401,000 soldiers who succumbed during the Crimean campaign, 30,000 only were actually killed in battle, some 300,000 dying from disease."

It is to be regretted that so many of Col. Hart's quotations are given in French. To be sure, it may be assumed that educated military men, the world over, read French, but there are very few who would not, nevertheless, prefer to have an English book in the English language. This, however, is but a minor defect. The book is well worth careful perusal, and it should be in the library of every officer who takes an interest in his profession.

ARTHUR L. WAGNER,
Captain, 6th Infantry.

Modern Guns and Mortars.*

The issue of this work by the War Department, a month or so ago, completed the series of pamphlets projected by General Schofield in January, 1892, as a "Course of Instruction for Artillery Gunners."

The projected series embraced, besides this work, pamphlets on the following subjects:

"Gunpowder and High Explosives," "Electricity and its Application in Artillery Practice," "The Use of Meteorological Instruments," "Range and Position Finding," "Ballistics," "Permanent Works and their Attack by Siege Operations," "Mathematics."

These pamphlets were issued by the War Department in 1893, as Artillery Circulars, B, C, D, E, F, G, and H, respectively.

The long delay in the issue of the pamphlet on "Modern Guns and Mortars" was apparently due to two causes: 1. The untimely and lamented death of Capt. Morrison, who began the work in accordance with instructions received in February, 1893. 2. The magnitude of the subject and the great number of drawings necessary to be made in order to comply with the instructions requiring the text to be illustrated by drawings whenever possible.

Now that the pamphlet, or rather book as the word "pamphlet" fails to give an adequate idea of its size, has appeared, it will be at once admitted by all artillerymen that no little credit is due the authors for the admirable manner in which they performed their work, and, also, that the pamphlet will be of immense benefit to the artillery since it has now begun to be supplied with the material therein described.

The language of the text, in conformity with the instructions given for the preparation of the pamphlet is simple and direct, clear and concise, and the drawings illustrating the text are most excellent. With the aid of the drawings, it is thought that the most intelligent gunners of a battery will be able, of themselves, to obtain a fair knowledge of the subject by a careful study of the text. In case of such gunners as may be unable to comprehend a drawing, the work will prove of great value to them, if it is taken out to where one of the new pieces, being studied, is mounted and there read.

As to how time for study of this and all the other pamphlets enumerated above or even of selected portions of them, is to be obtained is a difficult matter to determine, especially when the limited education of the class of men from which gunners are now necessarily selected and the great amount of other work and study that gunners already have to do, is considered.

**Modern Guns and Mortars* (Artillery Circular 1, series of 1893). By the late Captain C. C. Morrison, Ordnance Department, and Captain J. C. Ayres, Ordnance Department.

In view of this fact it is believed that no clearer showing of the pressing need of a better class of men for the artillery and hence of higher pay for the non-commissioned officers at least, could be made than by collecting these pamphlets and all the other books, etc., that gunners are now required to learn, such as the "Infantry Drill Regulations," "Tidball's Manual," and the various handbooks and range tables pertaining to "Minimum Qualifications," and laying them before the military committees of Congress with a statement that a class of men capable of comprehending these subjects is essential for the efficient service of Modern Scientific Artillery.

A. M.

Descriptive Pamphlet of Overman Wheel Co.

A beautiful pamphlet from the Overman Wheel Co., profusely illustrated with Japanese designs, gives one an idea of the good things in store—in the bicycle way—for 1896.

In the man power vehicles the great problem will always be how to secure the maximum of speed with the minimum of draft. All things considered this problem approaches to a close approximation of a definite solution in the machines put forward in competition for the trade of 1896, the Victor machines being, of course, prominent claimants for favor. The Victor weights have been reduced for the coming year but not at the expense of strength or safety.

Among the improvements mentioned we note that the upper forward tube in frames Nos. 3, 4, 5 is parallel with the ground line. The head dimensions are 9, 11, and 13 inches respectively.

The diameter of the upper rear tubes has been increased from $\frac{1}{2}$ -inch to $\frac{9}{16}$ -inch.

The diameter of the upright tube has been increased from 1-inch to $1\frac{1}{8}$ inches. A similar change has been made in the lower forward tube. The crank axle has been shortened $\frac{1}{2}$ -inch and the tread narrowed by the same amount.

The number of spokes in the rear wheel has been increased from 28 to 32; in the front wheel from 24 to 28.

The new parts on the '96 model are as follows:

- New rear hub and axle;
- New rubber pedals and axles, convertible to rat-trap;
- New rat-trap pedals, convertible to rubber;
- New front fork and fork crown;
- New head collars, shorter and neater;
- New handle bars, narrower and neater;
- New saddle, adjustable, to replace No. 15;
- New Victoria saddle, both tilting and adjustable;
- New step, detachable lamp bracket, and coasters;
- New double and single moulded tires, $1\frac{3}{8}$ -inch single and $1\frac{1}{2}$ -inch both double and single.

The above are not simply changes, but improvements in form and refinements in construction that will distinguish the 1896 Victor.

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